COAL AGE

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Devoted to the Operating, Technical and Business Problems of the Coal Mining Industry

JOHN M. CARMODY
Editor

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Self-Government

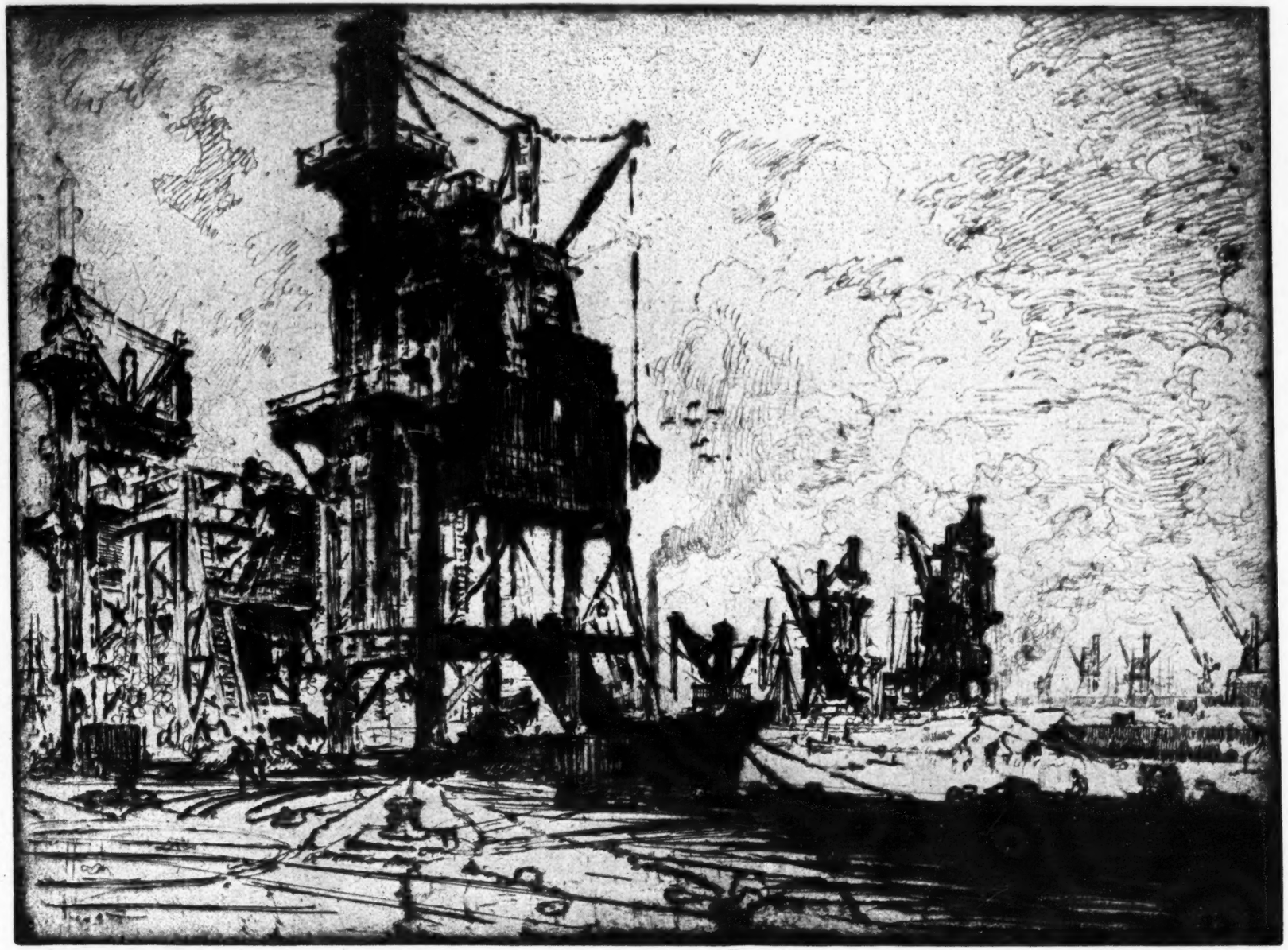
COAL MEN everywhere will cry amen to the declaration of Harry L. Gandy, executive secretary of the National Coal Association, that the bituminous industry "has measured up to its responsibilities in the field of production, but, as is the case with many other industries, has had an unsatisfactory record in the field of realization." How this latter record may be improved is the problem which haunts executives from West Virginia to Washington. Suggestions that the solution lies in external control have been definitely and repeatedly rejected. Obviously the only remaining alternative is more effective internal regulation.

THIS ALTERNATIVE long has been recognized, but the struggle for individual existence has been so appalling and the fear that efforts at self-government would be viewed with jaundiced eyes by federal authorities so great that the obvious has been neglected for more tortuous attempts to arrive at general stabilization. In this fear, which is not without foundation in fact, is the tacit admission that one of the evils now besetting the industry is an excess of external regulation. The question therefore arises as to how internal control may be substituted for this oppressive outside supervision.

A BEGINNING, at least, can be made, it is believed, in local and national group action to eliminate unfair and uneconomic trade practices. The National Association of Purchasing Agents is attacking evils which have grown up under dog-eat-dog competitive selling by sponsoring a buying code for the guidance of purchasers and sellers. The impetus for this code came from an editorial campaign initiated in the *Electrical World* by Earl E. Whitehorne. A number of other business organizations in co-operation with federal agencies are seeking solutions of their peculiar problems.

HOW FAR like plans may be employed to improve the situation in the bituminous coal industry will be one of the major keynotes of the eleventh annual convention of the National Coal Association, which assembles at Cleveland next week. With rare courage in the face of the general and natural hesitancy of coal operators to embrace any project which involves relations with a government bureau of regulation, the program makers for the Cleveland meeting are asking the membership to give serious consideration to the possibilities for good and evil inherent in such a plan. If there were nothing else on the program, that topic alone would justify the attendance of every member at Cleveland.

THAT those who will not govern themselves must submit in the end to the imposition of external control is a doctrine so well documented that it no longer requires exposition. It is as true of industries as of individuals; indeed, the greater the group, the greater the need. The coal industry has been criticized in the past for opposition to external regulation while doing nothing to effect internal reform. By its present proposals the National Coal Association is forcefully challenging the validity of that criticism.



Courtesy Kennedy & Co., N. Y.

Handling Coal at Cardiff

From an Etching by
Joseph Pennell

USE SHORT BATTERY

To Save Coal and Lives

The Washington Practice May Have Application to Anthracite Fields

By James McKim
Carbonado, Wash.

MINING the coal beds in Pierce County, Washington, which often dip at steep angles and are subject to extensive folding and faulting, has produced a large variety of methods, many of them far from simple. As a rule the coal seams of this district were under 10 ft. in thickness until the opening of the Morgan seam about four years ago. This seam, the coal of which does not run easily because of bony streaks and the friable nature of the coal, has necessitated the use of an unusual method of mining.

The usual methods of mining in this district are the chute-and-pillar and the breast-and-pillar systems, though a modified longwall plan was used in one of the seams. A typical method is shown in Fig. 1. Chutes are driven on 45- to 60-ft. centers from the gangway. These are 4 ft. wide where every fifth one is used as a manway, or 8 ft. wide if divided into a chute and manway by a brattice line built up the center of the chute. Upon completion of a chute pillar extraction usually is started. The upper rib is lagged or bratticed off, or a row of cogs built to protect the miner, after which the pillar is removed by taking skips off the solid pillars. A new line of cogs or batteries is placed at each crosscut to protect the miner, and a thin rib is left on the side of the block until the next line of cogs is in place.

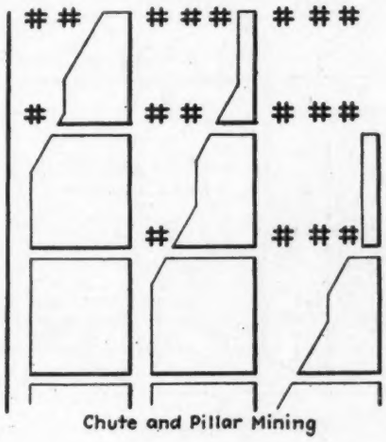
Timbering may consist of single props or stalls hitched into the foot and hanging wall, or four-piece sets with tight lagging under the sills and over the cap pieces. Seams up to 12 ft. may be timbered, but many consider over 10 ft. as dangerous. For this reason thick seams require "booming" or the extraction of the coal without the use of timbers. Such a method is handled easily where the coal runs freely, as it is necessary only to widen out in the coal above the crosscut with short angles to either side or shoot out the coal on either side of the chute as shown in Fig. 1. The solid coal in the block above must run out easily as it is dangerous for the miner to enter the area above the battery after the first widening-out process.

Ordinary methods were not adaptable to the Morgan seam, where the coal is 14 to 17 ft. thick and lies from 20 deg. to vertical. This seam, the coal of which does not run easily, has been developed on the chute-and-pillar system, using 8-ft. chutes 5 ft. high, divided into coal chute and manway. Originally the plan was to extract 5 ft. of bottom coal, timber the rest under a slip and shoot down the top coal. The timber formed a mat which blocked the coal, however, resulting in very poor recovery. Next an attempt was made to timber against the roof with 10- or 12-ft. props, leaving the remaining 5 ft. of coal on the bottom. There was no slip in the top coal which would allow the miners to timber against this upper portion.

This method worked quite satisfactorily on coal up to 40-deg. pitch; above 40 deg. it proved too dangerous as the footwall coal could not be held in place when such long timbers were used. The bottom coal and timber would be swept down the pitch without much warning, and as a consequence a system of extracting all the coal from foot to hanging wall was decided upon for the heavier pitch.

Certain difficulties immediately developed in the application of the methods usually followed in this section. First, the seam ordinarily has two or three bony streaks, which prevent the coal from running freely even after angles are driven through the block and the coal is cut from foot to hanging wall. Again, the coal, a soft, friable, gas and coking coal, breaks up so fine that it will not run out freely if allowed to remain in the pillar for any length of time. This eliminates the possibility of working out a very wide section, in which the mined coal supports the roof and serves as a footing for the miners.

Another difficulty was experienced



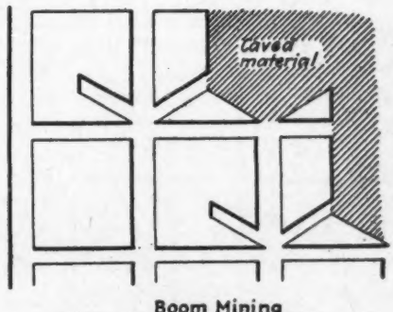


Fig. 1—Mining Systems for the Thinner Seams

from slips in the roof, which often permit large slabs of loose rock to come down ahead of the coal. This last situation demands fairly rapid extraction of the block after it is opened up to any extent. Systematic planning to combat the disadvantages outlined above resulted in the adoption of the scheme shown in Fig. 2, which gives the relative position maintained in extracting the pillars. It will be noticed that in this method the upper crosscut of each pillar is kept open until the block is completely mined out. Fig. 3 indicates the stages in extraction of one block of coal.

This operation—starting with the left hand block of coal in the plan shown in Fig. 3—consists of splitting the block and "booming" the coal. An opening through the pillar is driven as shown in (a) and (b). The small crosscut — "doghole" — is used as an airway in driving and affords a safe retreat during subsequent widening as shown in (c), (d) and (e). The coal is left in place for the miner to stand on and in (e) and (f) the coal is shot out above the crosscut and the "doghole," and the coal pulled out of the opening. In (g) and (h) the small remaining stumps are shot out. The last small stump often is left until the coal above the main crosscut has been run out and the gob comes in.

In easily running coal having a poor hanging or footwall neither of the above systems will work, as the footwall or hanging wall rock will cave in before any area is opened up, thus blocking further recovery of the coal. The only solution for this situation involves a great deal more narrow work in splitting the block into small enough sections so that a fairly high percentage of recovery may be accomplished.

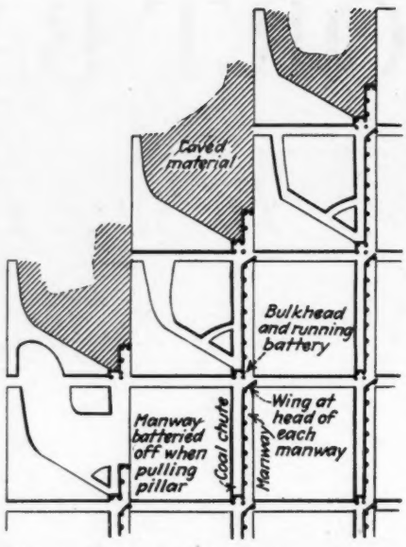


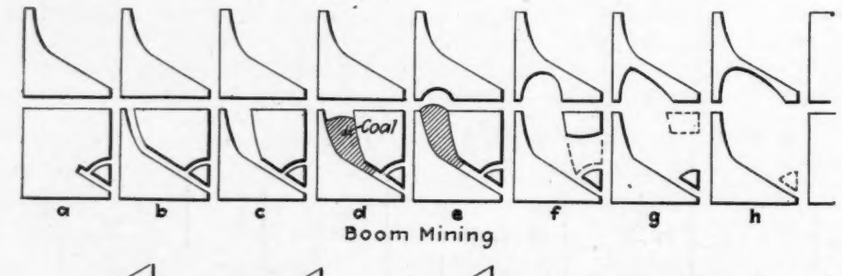
Fig. 2—"Booming" in the Morgan Seam

The system in Fig. 3 will not work with non-running coal unless the roof is fairly strong. At one time the writer was confronted with a small section of coal about 15 ft. thick with a very poor roof. As a result of his experience in mining this coal, where unusually good recovery was made, the following variation of the above system of "booming" is submitted:

Removal of a block (Fig. 4) consists in driving an angle through the block as shown in (1) and (2). The coal is then shot out above the angle, leaving a 6- to 15-ft. stump next to the chute. A second angle is then driven as in (3) upon caving of the roof in the first. Continue shooting the coal down on the cave and running through the upper angle. The average distance advanced up the pitch will be about 12 to 15 ft. Advance up the pitch to the desired distance as in (4) and then retreat, pulling the stumps next the chute as in (5) and (6).

Heavily pitching coal seams 10 ft. thick or over, when no good slips or partings are available under which to timber, are more safely and economically mined by a "booming" system. With a free-running coal and a strong foot and hanging wall any of the usual methods will give satisfactory results. If the coal does not run easily and has a fair roof, "boom mining," as shown in Fig. 3, though high in development costs, is recommended. It will work with either running or non-running coal and will insure safety and good recovery. Free running coal having a weak hanging or foot wall requires that the block be split in such a maner that not over a fourth or sixth shall be "boomed" at one time. With non-running coal and a weak roof the alternative method of Fig. 4 is recommended.

Fig. 3—Removal of Pillars in "Booming"



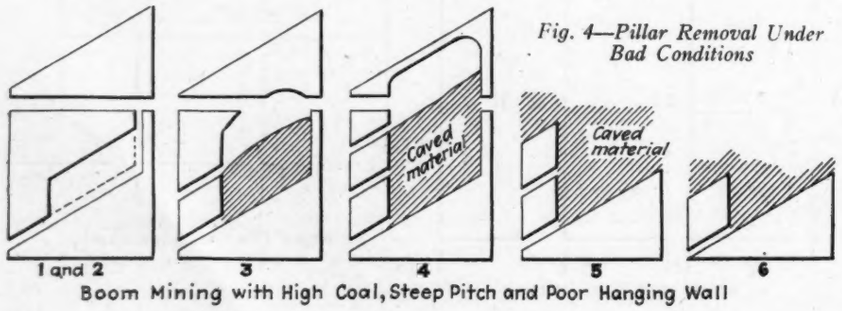
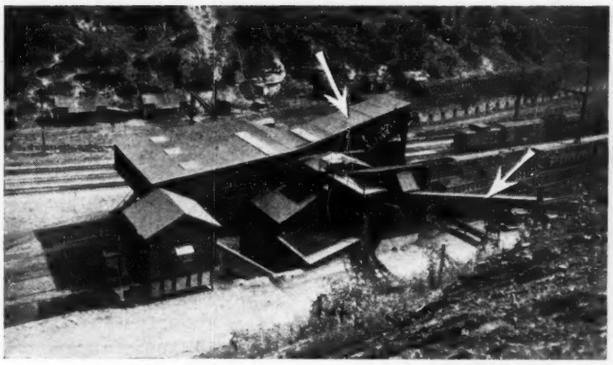


Fig. 4—Pillar Removal Under Bad Conditions

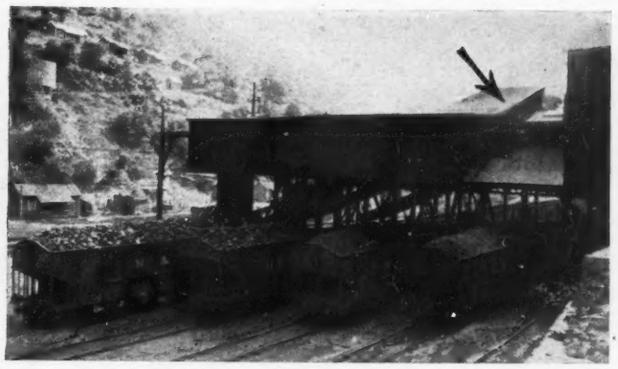
Size of Particles Fixed by Electrical Screening

Preliminary experiments at the Pittsburgh Experiment Station of the U. S. Bureau of Mines have shown that by spreading fine dusts of coal and coke of similar composition upon a conducting plate and placing a second plate a certain distance above, a size-separation of the particles is accomplished upon applying between the plates sufficient electrical potential to lift the smaller of the particles to the upper plate. Even when using a relatively crude apparatus for obtaining the required potentials, consisting of an induction coil and key for breaking the circuit, the sizing of the particles is superior to that obtained by air elutriation.

Obviously, before the best results can be expected, a more nearly constant and controllable source of potential (up to perhaps 10,000 volts) than obtainable with the induction coil must be used. Constant and non-oscillating potentials up to 100,000 volts may be obtained with an electrical hook-up involving three electrode vacuum tubes. The obtaining of dust samples of fixed particle size is a prerequisite to fundamental research on dust explosions since the explosibility of dust of a given material depends largely on particle size.



Arrows Point to Separator Addition and Shaker Trough Over Highway



Another View Indicating Wing That Was Added to Upland Tipple

SIXTEEN COMPANIES *In West Virginia* INSTALL WET WASHERS

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By J. H. Edwards

Associate Editor, Coal Age

COAL cleaning has advanced by enormous strides in the last few months. A large part of the delivered cost of coal is freight, so why not lower this item by eliminating all the inert material in the coal before shipment? Ash removal is costly in cities and reduces combustion speed, so why not take out of the coal at the mine plant as much of the ash as possible and thus save the consumer part of the cost of ash removal and increase at the same time his stoker capacity.

The consumer of coal is seeking to save himself from freight, coal-handling and ash-transportation costs; he is seeking to get more power out of his equipment. Consequently, the Pocahontas operator facing competition has equipped himself to give the consumer just what he wants, knowing that with a better article operation will be more regular and more profitable.

Perhaps no feature of the progress of coal cleaning has been more striking than the almost overnight installation of 24 Menzies Hydro-Separators at mines operating the Pocahontas No. 3 seam in the Norfolk & Western R. R. field of West Virginia and Virginia.

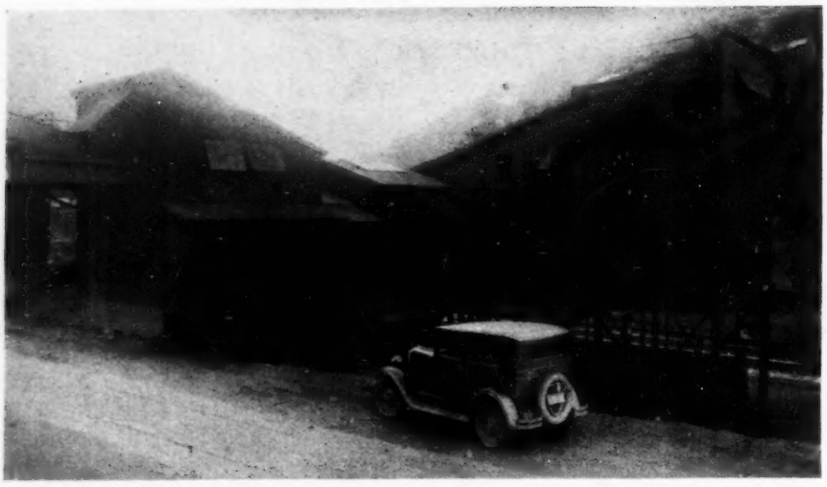
In the summer of 1927 not a single mine in the field had this equipment. Now thirteen tipples operated by eleven companies have the 24 units mentioned in operation marking a further development in Pocahontas preparation methods, to say nothing, of the ten hydro-separators being operated at mines that work in other seams. Only Pocahontas No. 3 equipments are enumerated in this list:

Companies Whose Product Is Sold by the Croxer-Pocahontas Co.	Number of Separators	Location
Croxer Coal & Coke Co...	Two	Elkhorn, W. Va.
Upland Coal & Coke Co..	Two	Elkhorn, W. Va.
Powhatan Coal & Coke Co.	One	Powhatan, W. Va.
Lynchburg Coal & Coke Co.	Two	Kyle, W. Va.
Peerless Coal & Coke Co...	Two	Vivian, W. Va.
Page Coal & Coke Co.....	Four	Pageton, W. Va.
Pocahontas Fuel and Associated Companies:		
Pocahontas Fuel Co.....	Two	Pocahontas, Va.
Pocahontas Fuel Co.....	One	Freeman, W. Va.
Bottom Creek Coal & Coke Co.....	Two	Vivian, W. Va.
Pulaski Iron Co.....	Two	Eckman, W. Va.
Other Companies:		
American Coal Co.....	Two	McComas, W.Va.
Mill Creek Coal & Coke Co.	Two	Coopers, W.Va.

The equipment is simple in the extreme: merely an upward flow of water through a sloping screen plate over which the coal feeds by gravity. This stream effects the separation. The velocity of the upward flow is adjusted so that materials exceeding a certain specific gravity will remain near the bottom and pass out through the gate at the lower end of the screen plate and those which are lighter will be carried upward by the water and lifted over a buried weir whence it travels by a water chute. The rejected material is removed by a slate conveyor. The separators are designed to wash egg, nut and pea sizes.

Simplicity, small space requirements, low installation costs and small power consumption are factors aside from cleaning efficiency which have given these separators their hold on the bituminous field. Traveling through the Pocahontas region, however, the extensive development of this feature of mining does not strike the visitor. He can travel by the tipples without suspecting that they contain mechanical cleaners because their introduction has added so little to the size or height of the structures.

Features which exemplify the sim-



Showing Raw Coal and Refuse Conveyor Mounted on Outside Wall of Separator Addition

* * *

plicity and spatial economy in these machines are the construction of the separator and slate conveyor of each unit as part of a single machine and the fact that the separating chambers have an inside width of only 30 in. for an average capacity of approximately 30 tons an hour.

Operators report that the installation costs of a single unit, including coal and slate conveyors, and the steel additions to tipple structures, have run approximately $500 for each ton of hourly capacity, but with two or more units in the plant that figure can be materially reduced.

THE accompanying list of installations at operations in the Pocahontas No. 3 seam shows that the companies whose product is sold by the Crozer-Pocahontas Co. have thirteen separators in use. Among these is the Upland Coal & Coke Co., at Elkhorn, W. Va., which has a comparatively new Roberts & Schaefer tipple that is typical of the others and so will be treated briefly. The illustrations in the headpiece show how little the plant was enlarged by the addition of the separators.

Two 30-ton units, one handling 1¼x⅝-in. nut and the other 2½x1¼-in. stove, are installed side by side, and with their washed-coal chutes discharging directly onto booms or loading chutes.

The entire equipment including an Arms 1⅛x⅝-in. double-deck screen is housed in a wing that has been added to the tipple. The floor is approximately 18x30 ft. and the headroom 28 ft. The conveyor which brings the 2½x⅝-in. coal from the Marcus screen to the Arms screen, at the top of the separator structure, is mounted outside along the wall. The upper run carries the cleaning-plant reject back to the main refuse-disposal system of the tipple.

Centrifugal pumps which force the water up through the screen plates are located directly back of the separator boxes so that the pump-discharge pipes are not over 5 ft. long. There is a 7½-hp. pump for each separator. One water tank, 10x14-ft. in plan and 5 ft. deep, located under the washed-coal discharge chutes, serves both separators.

The impurity to be removed consists principally of drawslate, but some bone is found that will sink in a liquid of 1.45 specific gravity. According to R. A. Ruff, assistant manager, the separation is quite satisfactory. "If we don't run above rated capacity we get almost as perfect a separation as we make in float-and-sink tests at 1.45 gravity, except that some very thin and flat pieces of slate may be carried over with the coal.

"After a trial it was found advantageous to make a slight change in construction so that the coal would be fed into the upward-flowing instead of into the eddy water. We have already let contracts to install a sludge-recovery system consisting of a larger tank and a small sludge conveyor. This will add about 20 per cent to the original cost but will give us a product that is freer of sludge."

ASIDE from the Hydro-Separator installation, the tipple itself is of interest. It is a five-track steel structure rated at 250 tons per hour and is comparatively new, having been put into operation in 1926.

The coal is transported from the dumphouse down across the state road and to the tipple by a 140-ft. shaker trough equipped with a 20-hp. drive of Marcus design. The pitch is approximately 20 deg. This method of moving the coal provides for its transfer to the screen without drop.

Ease in handling is characteristic of the entire tipple operation. The coal flows along the horizontal picking table screens and likewise moves on into the cars on Roberts & Schaefer shaking loading booms.

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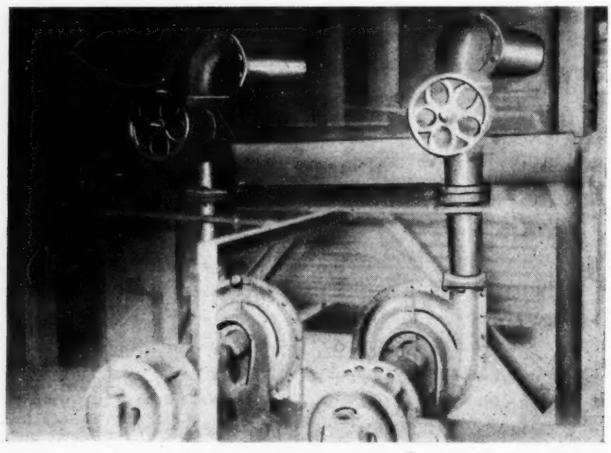
Separators Are Directly Back of Two Coal Discharge Chutes in Center

Back View of Equipment Showing Centrifugal Pumps and Separator Boxes



How Well Does It Pay To Treat Mine Timber?

By A. D. A. Crawford

Lee, Higginson & Co.
Formerly Special Engineer, Hudson Coal Co.

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MOST writers on wood preservation as applied to coal mines have assumed that the lumber is treated in a plant operated by the mining company itself. The unfortunate phase of this assumption is that in 90 per cent of the cases the mine operators are not willing to assume the large initial expense of an efficient treating plant and they therefore attempt to treat by non-pressure methods, which give poor results and cause further experiments along the line of wood preservation to be discontinued. If timber preservation is worth doing at all it is worth doing well, and the best, most reliable and most generally accepted method is by pressure treatment. Open-tank treatments, spraying and painting generally are unsatisfactory. Therefore in the calculations that follow the treatment to be used is pressure treatment.

In estimating the cost of a treating plant, most writers on the subject give a cost which is far too low in that their calculations cover only cylinders, pipes and measuring tanks, making no mention of the other expenses incidental to erecting treating plants, such as the grading of a seasoning yard, the covering of ground with ashes or cinders, the laying of track for tram cars serving the cylinders, the purchase of locomotive cranes or other timber-handling equipment, conveyors, saws, etc.

The total of these incidental expenses frequently is as great as or greater than the cost of the cylinders themselves. For example, a seasoning yard and plant large enough to treat 1,000,000 cu.ft. of timber per year would cost in the neighborhood of $125,000, not including the cost of the land itself. The plant, the treating cylinder, pumps, etc., would cost from $25,000 to $50,000. Mine operators usually are unwilling to make such an expenditure, and the use of treated timber consequently is deferred or dismissed from consideration.

Very little has been said about the possibilities of utilizing already existing treating plants though the reason for this is not clear. The same reason that impels the operator to purchase other supplies from existing manufacturing sources applies in a somewhat lesser degree to wood preservation.

The first thing to consider is the requirements of the mine for treated material, which, for the ordinary coal mine probably will vary from 10 to 15 per cent of the total amount of timber used per year. In order to determine the economical quantity to treat, a forecast must be made of the roads or haulageways which will remain open a sufficient number of years to allow the treated timber to pay for itself. This study will not only enable the operator to arrive at the quantity of treatable material that the mine can use but also will yield indirect economies resulting from valuable knowledge of operating conditions.

IN DETERMINING the requirements for treated timber some definite unit of measurement must be selected. Wood should be measured in terms of a constant quantity, namely, volume. Ties, lumber, poles and piling are now so purchased. The most desirable and easiest unit is the cubic foot. Timber for mine use is sometimes purchased by the lineal foot and sometimes by the ton, neither of which is exact. Ten lineal feet of timber 10 in. in diameter contain approximately 5½ cu.ft., whereas 10 lin.ft. of timber 12 in. in diameter contain approximately 7.9 cu.ft., although there are 10 lin.ft. in each case. Purchase by the ton involves the condition of the timber, the amount of bark, irregularity of the sticks, the degree of seasoning and the type of wood. It is therefore not a suitable unit of measure.

The cubic foot seems to be the most equitable unit of measurement, and is in current use by treating companies. A rough method of determining the cubic feet of wood in any given timber is to consider that the stick in question is a cylinder whose diameter is the diameter of the stick under the bark at the midpoint. This is not entirely exact, but is sufficiently so for all practical purposes. It is quite readily computed as follows:

A stick 1 ft. long having a diameter of 10 in. contains 0.545 cu.ft., arrived at thus:

$$\frac{3.1416d^2}{4} = \frac{3.1416 \times 100}{4 \times 144} = 0.545$$

The diameter is expressed in feet, i.e., $\frac{10}{12}$ of a foot. Having found the number of cubic feet per foot of length, it is necessary to multiply by the length of the stick, and the result is the volume in cubic feet.

Before attempting to compute the economies to be derived from the use of treated timber it is first necessary to determine as exactly as possible what the present costs are on the cubic-foot basis. The basis of so much per "set" of timber also may be used, but this is inexact as the cost of a set varies with the diameter of the pieces, whether it is an ordinary set or one for a passing branch, etc.

A number of factors enter into the cost of the untreated stick in place in the mines. The first item is the cost of the raw timber at the place of origin. To this must be added freight to the mine, the cost of unloading at the mine, sawing the long sticks into required lengths, loading the timber into mine cars and erecting it in the mine.

For mines purchasing timber by weight or on a lineal-foot basis, the cost per cubic foot may be obtained as follows: As the car is unloaded a tally is made of the number of feet of timber 6 in., 8 in. or 10 in. in diameter. From these data the number of cubic feet in a shipment can be computed and the cost per cubic

foot ascertained. The weight as shown by the bill of lading divided by the cubic feet in the shipment will give the weight per cubic foot. If a sufficient number of shipments—a hundred or more—is studied in this way the cost per cubic foot can be quite accurately computed. This cost may or may not include freight. The freight per cubic foot should be computed from the weights per cubic foot already determined by applying the freight per 100 lb. as given by the railroad rate schedule.

The cost of unloading varies tremendously, depending on the particular operation and the equipment available, but it can be determined by a time study or the total cost over a period of time. The cost per car or per month divided by the average cubic feet per car or per month will give a good basis for cost computation if not less than 50 cars or not less than one month's operation be used as a basis of calculation.

The cost of loading into mine cars, etc., can be obtained by time study or by dividing the monthly cost by the number of cubic feet used. The cost of erection in the mines usually is shown on the rate sheet as so much per prop or per set and may readily be expressed in terms of cubic feet. For props purchased on a lineal-foot basis the conversion into cubic feet is even simpler than for those purchased by weight and the method is easily understandable.

IF TIMBER is obtained from widely separated sources or if woods differing widely in characteristics and weight are used, these cost computations should be made for each source and type.

Each particular mine operation has its own cost for these various phases of the erection of timber, an average cost for a Pennsylvania anthracite mine using timber from the Southern pine fields being as follows:

Cost untreated (f.o.b. point of origin)	$0.1275
Freight direct to collieries	.1575
Sawing	.0250
Unloading at mine	.0250
Labor renewal	.3000
Total	$0.6350

After determining the requirements in cubic feet and the present cost of using untreated material, the next step is the consideration of what treating plant can be utilized economically. On request, the U. S. Department of Commerce will provide a list of all the commercial treating plants in the United States. From this list one can be selected which is in a direct line between the source of raw material and the mine.

The cost of treating timber at any given plant will depend on the company operating it, the volume of material handled per year, the preservative used and the freight rates from the point of origin to the treating plant and from the treating plant to the mine.

There are several other items, however, which must be taken into account in the use of treated timber. The first item is peeling. Untreated timber usually is used with the bark on but treated timber must be peeled and the peeled stick seasoned to get the maximum penetration effectiveness from the treatment. This cost will vary with the type of wood to be treated, the labor cost, the supply of the timber producers and other factors. The average cost of peeling, however, should not exceed 2c. per cubic foot.

IN ORDER that the treatment shall be effective the timber must be cut or framed first. This adds a cost item, as in many mines the man erecting the timber also frames it, and the cost already framed will be the same as the cost of framing and erecting in the case of untreated timber. This, of course, is subject to the labor conditions existing at the mine where the timber is to be used. In some localities it may be possible to erect timber which does not have to be framed at a lesser cost than that which does. In unionized fields, however, it is extremely doubtful if this saving can be affected. The cost of framing timber is approximately 60c. per set and there are about 15 cu.ft. per set, giving a cost per cubic foot of 4c. However, as all the timber does not have to be framed a cost of 2c. has been assumed as a proper charge for this service, based on the supposition that one-half the requirements are props which do not have to be framed.

The cost of treatment will depend on the volume, it being obvious that if a large volume of material is treated, the plant will charge a lower price. A cost of 10¼c. per cubic foot may be assumed. This charge includes unloading the material at the treating plant, treating it and reloading it for shipment to the mines. This is a very low figure, but for quantities of timber from 500,000 to 1,000,000 cu.ft. per year this rate is fair.

The cost of preservative depends entirely on the type used. In this connection creosote must be given consideration as it is one of the best known and most efficient toxic agents that can be employed. Railroads have used it for a great number of years and its reputation is established. Unfortunately, creosote is not adapted to mine work for three reasons: It has an unpleasant odor which would vitiate the air in the mine to some extent; its action on the skin is caustic and its use might cause labor difficulties; timber seasoned after treatment with creosote does not ignite as easily as untreated timber, but once ignited it burns fiercely and gives off a large volume of acrid smoke.

THE preservative to be used in mine work, therefore, should be a salt. There are several on the market: zinc chloride, zinc meta-arsenite, Aczol, Wolman salts and sodium fluoride. These are divided into two classes, water soluble and non-water soluble, and their respective advantages may be judged by their adaptability to other forms of timber preservation. While their cost varies somewhat, it is safe to assume the cost of the preservative at 6c. per cubic foot for all of them except one.

As explained before, pressure treatment is much more advantageous than open-tank treatment. However, unless the timber has been properly air- or steam-seasoned, the penetration of the preservative will not be as thorough as it should be. To aid in determining the penetration after treatment, an inspection should be made by taking increment borings of several timbers on each tram, using a chemical-indicating solution to give a visual determination. The treating operation should provide complete sapwood penetration and in some species complete heartwood penetration.

The above costs have been summarized in Table I, it being assumed that a suitable treating plant has been located near the operation.

Table I—Cost of Treated and Untreated Timber

(Per Cubic Foot)

	Untreated	Treated
Cost untreated f.o.b. point of origin	$0.1275	$0.1275
Peeling	.....	.0200
Freight direct to mine	.1575	.....
Freight to treating plant	.....	.1575
Freight treating plant to mine	.....	.0450
Sawing	.0250	.0250
Framing	.....	.0200
Unloading at mine	.0250	.0250
Treatment	.....	.1025
Chemicals	.....	.0600
Labor renewal	.3000	.3000
Total	$0.6350	$0.8825

The usual method of comparing the annual cost of two materials serving

the same purpose but having different lengths of life is the annual charge method of the American Electric Railway Association, which is simply the formula used in determining sinking funds plus interest. This formula assumes that the rate received on sinking-fund payments is equal to the interest rate which must be paid for money. However, some companies may be able to borrow at a lesser cost than the sinking-fund payments earn while others must pay a higher rate. In either of these cases the annual charge formula would be slightly inaccurate. However, this formula is sufficiently accurate to give a good picture of the annual charges and therefore is used.

In the following tables it is assumed that the average life of untreated timber is three years and that of treated material from eight to ten years. This is a very conservative estimate and in practice the life of treated material exceeds eight to ten years by an appreciable margin. In estimating the life of treated material there is a very important factor involved which is frequently omitted in calculations, namely, the element of crush or squeeze. In practically all mines there are some gangways that have unexpected falls of roof which are so heavy that they will break any material, regardless of whether it is rotten or sound.

AS IT is impossible to foretell just where crushes will occur, treated timber should be used throughout. Untreated material might be put in a supposedly bad place and the crush never occur. If a squeeze does occur and the treated timber is broken it means that an investment of more than 50 per cent in excess of that involved in a similar amount of untreated timber is wiped out. On the other hand, if treated material is not put in these roads, the squeeze may never occur and several renewals may be necessary because of decay.

It also is true that weight or pressure often is blamed for timber failures when the cause actually is decay in a more or less advanced stage. Timbers that are partly rotten will fail where sound timbers would successfully withstand the pressure. Treated timber will pay large dividends under such conditions and should be used. In most cases of this kind the inspection of the piece which failed is superficial and inexpert and the cause erroneously ascribed to what is really a secondary cause, viz., pressure, whereas the primary cause—decay—escapes attention and comment.

This question is sufficiently important to warrant a close examination by a competent person, as otherwise the mine operator may decide that the crush or pressure factor is too large to admit of even a trial of treated material and thousands of dollars may be lost. Section foremen and others are frequently guided by their preconceived opinions of what the cause *should* be and their observations are colored by these opinions. Unbiased and expert opinion therefore is necessary before finally deciding the cause of timber failure.

Table II—Annual Charges Per Cubic Foot

Average life untreated: three years.
Average life treated: eight or ten years.
Permanent and semi-permanent timber destroyed by crush: 20%.

Annual charge formula $= \frac{Pr\,(1+r)^n}{(1+r)^n - 1}$

in which A = annual charge including interest and amortization.
P = Original cost
r = Rate of interest expressed decimally = 0.06 in this case.
n = Life in years.

Life Years	Untreated	Treated
3	$0.2375	$0.3300
4	.1835	.2550
5	.1505	.2090
6	.1290	.1790
7	.....	.1580
8	.....	.1421
9	.....	.1300
10	.....	.1200

Annual charges allowing for crush or squeeze:

Untreated	Treated
$0.2375	*20%×0.3300+80%×0.1421=$0.1797
.2375	†20%×0.3300+80%×0.1200=$0.1620

*Based on a life of eight years for treated timber not destroyed by crush.
†Based on a life of te for treated timber not destroyed by crush.

IN COMPUTING the economies to be derived from treated timber an allowance of 20 per cent broken by crush or squeeze whose life is not increased by preservative treatment is included. To arrive at the proper annual charge under these mixed conditions involves the combination of two factors: (1) Twenty per cent of the treated material will be broken by unavoidable causes—crush or squeeze—without having its life increased at all. The charge for this portion therefore is 20 per cent of the annual charge for a three-year life. (2) The life of the remaining 80 per cent will be increased by preservative treatment to eight or ten years, and the charge for this portion therefore is 80 per cent of the annual charge for eight or ten years. The annual charge is the sum of these two factors—$0.1797 for 8 years (see Table II). Using $0.1797 and a consumption of 1,000,000 cu.ft., the annual cost for the first year will be $179,700 as shown in Table III. The same result can be obtained by assuming that 20 per cent of the treated material lasts three years and 80 per cent lasts eight or ten years. Thus 200,000 cu.ft. (20 per cent of 1,000,000 cu.ft. to be treated) lasting only three years will give an annual charge of $6,600, and 800,000 cu.ft. (80 per cent of 1,000,000 cu.ft. to be treated) lasting eight years will give an annual charge of $113,700, the sum being $179,700. The annual charges for untreated and treated material based on a cost of $0.6350 per cubic foot for untreated timber and $0.8825 per cubic foot for treated timber in place, shown in Table I, is as in Table II.

*Table III—Savings by Use of Treated Timber Based on Life of Eight Years**

Years	Untreated	Treated	Saving per Year
1	$237,500	$179,700	$57,800
2	475,000	359,400	115,600
3	712,500	539,100	173,400
4	712,500	539,100	173,400
5	712,500	539,100	173,400
6	712,500	539,100	173,400
7	712,500	539,100	173,400
8	712,500	539,100	173,400

*Allowance made for 20 per cent destroyed by crush.

*Table IV—Savings by Use of Treated Timber Based on Life of Ten Years**

Years	Untreated	Treated	Saving per Year
1	$237,500	$162,000	$75,500
2	475,000	324,000	151,000
3	712,500	486,000	226,500
4	712,500	486,000	226,500
5	712,500	486,000	226,500
6	712,500	486,000	226,500
7	712,500	486,000	226,500
8	712,500	486,000	226,500
9	712,500	486,000	226,500
10	712,500	486,000	226,500

*Allowance made for 20 per cent destroyed by crush.

Using the annual charges as shown above and based on consumption of 1,000,000 cu.ft. of material per year for three years or until all untreated material in place at the beginning of the cycle is treated, the annual savings are as shown in Tables III and IV.

A life of eight or ten years for treated timbers is much less than can be expected from almost any good preservative properly applied. Such a low figure has been used in order to be ultra-conservative and also because if a longer life—twenty years, for instance—were used, the economies would seem so large that nobody would believe them possible. The economies shown should therefore be considered as the minimum, for larger savings than shown can be obtained with almost absolute certainty.

The annual charge formula is the most equitable method of comparing the cost of materials used for the same purpose but having varying periods of usefulness. Many executives are not only interested in the annual charge but also want to know the treasury or "out of pocket" cost

(Turn to page 682)

Small Barrier Pillar Safe But Big One May Be Needed

By W. G. Strachan
Sonman, Pa.

HOW much coal should be left in a barrier pillar? A commission has been appointed by the Governor of Pennsylvania to determine that matter. It was discussed with interest at the meeting of the American Institute of Mining & Metallurgical Engineers last February. Perhaps the experience gained in the drowning out and unwatering of the Sonman shaft may aid in finding an answer to the question.

Sonman No. 1, now better known as "Old Bens Creek shaft," used to be the main hoistway of a colliery. It is now merely an emergency opening or escapeway and gives access to the *B* seam workings of the present Sonman shaft, which is operated by the Sonman Shaft Coal Co. Twenty-four years ago the present Sonman shaft was known as No. 2.

Early in 1904 the company operating Sonman shaft No. 1 decided to abandon the lower workings of the property and withdrew the pumps. This portion of the mine rapidly began to fill with water. At that time the mines having the nearest workings were known as Pennsylvania (or Hughes) No. 2, and Sonman shaft No. 2. The mine maps showed that the thinnest point in the barrier pillar between Sonman shaft No. 1 and the former was 67 ft.

Years later the pillar was cut at this point and the measurement verified. The maps showed over 900 ft. of solid coal between the nearest workings of Sonman shaft No. 2 and the flooded side of Sonman No. 1. The water rose till there were heads of 90.8 ft. of water against Pennsylvania No. 2 and 129.2 ft. against Sonman No. 2. The area flooded exceeded 100 acres, the thickness of the coal seam being 3 ft. 8 in. and the average pitch of the bed 9 per cent.

The mine inspector for the district notified the superintendent of Pennsylvania No. 2 that the pillar between the mines did not meet the state mining law. He in turn declared that he was of the opinion that the pillar would withstand the pressure. The inspector with two others examined the property and ordered that the barrier be strengthened, recommending methods of reinforcement.

A commission was appointed by the court, and it, in turn, appointed an engineer to ascertain if the flow of water was increasing under the constant head. It was found that it was not.

Sonman No. 2 shaft at this time was a new mine with no workings below the shaft level. Late in the summer of 1904 the inside force in that mine noted a material increase in the flow of water; large streams coming from the roof and bottom, some in the roof from points where more than 1,200 ft. of solid coal lay between the workings in the two Sonman shafts. An investigation showed that the water had receded a few feet in Sonman No. 1. Finally the level remained stationary.

It was evident that Sonman No. 2 was receiving all the water Sonman No. 1 was making. At last it was necessary to run the pumps 24 hours daily. If a pump were temporarily down for repairs, the sumps filled and the shaft bottom flooded. Finally one of the pumps broke down in a serious manner and the shaft was flooded to a depth of 50 ft.

IT TOOK eight months of labor and trouble till May 26, 1905, to get the water out, and then enough men would not venture into the mine to get out the required quota of coal. Blueprints and reasoning went for naught. Sonman shaft No. 1 had to be drained, and drained it was. The attempt was first made through Sonman No. 1 but finally success was achieved by tapping through from Sonman No. 2.

The conclusions that may be drawn are:

(1) If a mine should suddenly become flooded or if a company operating a mine which is not self-draining decides to let it fill with water, an adjoining mine at a lower elevation working the same seam of coal is in a difficult predicament.

A SMALL PILLAR will protect a mine against a considerable head of water as far as actual breakage is concerned but even a large one cannot be depended upon to defend the workings against extensive seepage that will make it necessary either to pump the water from the upper mine or let it into the lower mine to be handled at that point.

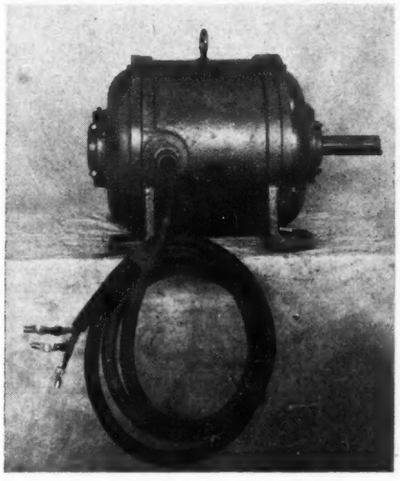
(2) If the thickness of the barrier pillar between the mines is not enough to comply with the state mining code, requiring in Pennsylvania 1 ft. of pillar for every 1¼ ft. of waterhead, and this is usually the case, the situation is worse. To tap the pillar and accept the water seems the only recourse for the company working the lower mine.

(3) Many believe that no matter what thickness of barrier pillar is maintained between the upper and lower mine the water will find its way through the strata over and under the coal seam into the workings of the lower mine. Consequently the lower operation will have to handle it.

(4) To leave such pillars as the law prescribes will also involve the loss of thousands of tons of coal in barrier pillars that can never be recovered.

(5) Unless the water is tapped the men in the lower mine will be frightened and refuse to work the coal, even though engineers and mining men go on record that there is no hazard.

Keep the Equipment PERMISSIBLE



Squirrel-Cage Induction Motor Rated 5 Hp., 1,150 R.P.M.

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By C. B. Hathaway
Motor Engineer,
Westinghouse Electric & Mfg. Co.

AN UNDERSTANDING of the development and construction of "permissible" motors is advantageous in the operation and maintenance of such equipment. This article is limited to motors of the industrial type such as are used on pumps, conveyors and hoists.

The original attempts in this country and in Europe to make motors which would be safe to operate in gassy mines followed the general theory of the Davy safety lamp. Fine wire gauze or banks of narrow passageways were provided through which air could be circulated to ventilate the motor windings but which would prevent flames from the burning gas inside reaching the atmosphere outside the motor. Such protective means were inherently weak mechanically and have been abandoned quite universally in favor of a totally inclosed compartment in which the entire electrical parts function in an atmosphere which is completely isolated from the outside air.

Thus the walls of such a motor must have sufficient strength to withstand the pressures occasioned by an explosion inside. This pressure is approximately 90 lb. per square inch for the most explosive mixture of gas and air. If the initial pressure of the gas is high, however, the pressure of the explosion may be a great deal higher than 90 lb. This may occur where two or more large chambers are interconnected by small passageways. An explosion in one of the chambers may cause the gas in the other to be compressed to a considerable extent before it becomes ignited. In such a case the explosion in the second chamber will be very violent. For this reason more than a single compartment in a piece of permissible apparatus is avoided if at all possible.

Where the wire gauze was used as a protection in the earlier types it acted as a relief valve to the pressure inside the motor. Thus the walls were not subjected to such high pressures and consequently did not have to be as rugged as in the totally-enclosed motor. But the gauze was effective only as long as it was intact. As soon as a hole or a tear appeared from corrosion or slight mechanical injury the protection was gone. A defect difficult to detect might bring serious results.

The bank of thin plates separated by a thin air space which also has been tried had the same disadvantages as the gauze. In addition the spaces were likely to become clogged with coal dust and therefore ineffective as a relief valve to the pressure.

STRICTLY speaking, the common type of totally inclosed permissible motor is not gas-tight. Gas under pressure can escape through the joints between the frame and the bearing supporting brackets, out along the shaft through the bearing, and past the pole bolts through the frame. All of these very narrow passages are made long so that the hot gases resulting from an explosion inside will be cooled by passing in a very thin stream over large areas of metal. Thus when the gases reach the outside they are too cool to ignite the gas outside.

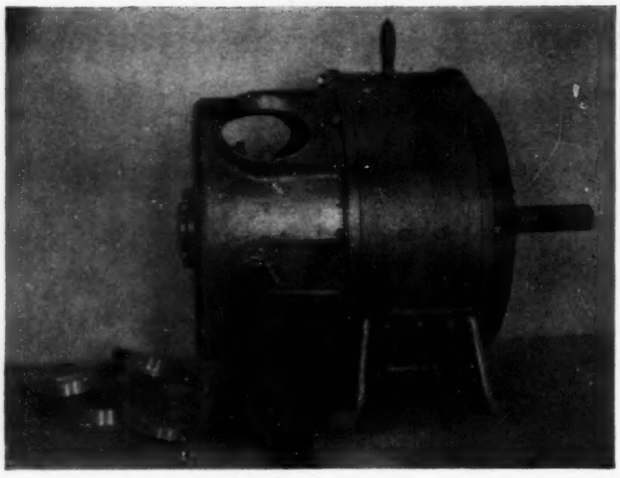
It is just as important to have a squirrel-cage induction motor incased in a flame-proof housing as it is a d.c. motor with its commutator, if it is to be operated in a gaseous atmosphere. While the probability of a spark occurring is rather remote, the danger of a short-circuit between coils or a grounded coil always is present, and if such an event were to happen it would be likely to result in disaster.

In selecting permissible motors attention should be given to the covers provided for the inspection of the commutator. The cover must, of course, be strong enough mechanically to withstand the shock of the explosion. It should be made so that it can be removed readily with the aid of the ordinary tools carried by an inspector. The covers should require the minimum of space for removal. This is essential in the limited space usually available in a coal mine. It is an advantage to have a cover that at a casual glance will indicate whether or not it is properly in place. The covers should be made of such material that they will not rust tight to the housing.

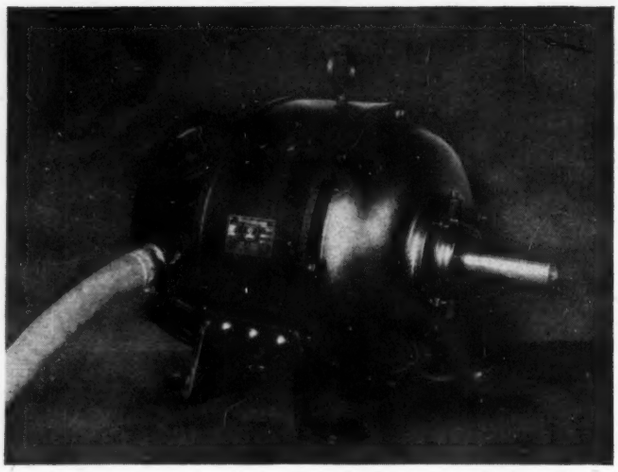
The bearings of permissible motors should be suitable for operation with the motor installed on uneven ground and be made so that the lubricant is not readily spilled when the motor is moved about. For this reason ball or roller bearings, grease lubricated, are well adapted for this application.

The care of permissible motors does not differ materially from other types. The electrical parts, such as the windings, brush rigging, commutator or collector rings, are the same as in the standard types. These parts should be inspected periodically to observe the condition of the brushes and commutator or collector rings. The inspection also should cover the possibility of a leak from the inside to the outside.

The motor should not be operated with a bolt missing. All bolts and nuts should be kept drawn down tightly and a lock washer or other locking device should be in place to keep each bolt from jarring loose. No gaskets should be added under the covers or elsewhere to correct



15-Hp. D.C. Permissible With Covers Removed



Permissible D.C. Motor, 5 Hp., 1,150 R.P.M.

some defect in a joint. If gas should explode inside of the motor or an arc take place the gasket is likely to be blown out, which would allow the burning gases to pass through readily and ignite the gas outside. Defective parts should be replaced by new ones rather than risk an explosion. Gaskets are omitted from new apparatus because they are easily damaged and when damaged they no longer provide a seal. Another objection is the danger of omitting them when reassembling the apparatus.

If a hole is provided on the outside of the bearing housing, lubricant can be added safely to the bearings of permissible motors without affecting their permissibility. This hole normally is closed with a pipe plug. The seal between the inside bearing housing and the shaft and between this housing and the end bracket must be sufficient to prevent the flames from the inside reaching the outside. In testing motors for permissibility the Bureau of Mines' engineers take out these lubricating plugs on the presumption that they might be left off in service. Although these plugs may be removed without breaking the inclosing seals they always should be replaced after adding lubricant to the bearings, in order to keep out dirt. Of course, they also offer an extra seal against flames even if they are not depended upon as such.

In caring for permissible motors the first thought at all times must be a well sealed chamber, because the units are intended primarily as safety devices. Then, if the other parts, such as bearings, commutator, brushes, and so on, are given reasonable attention the motor will perform as satisfactorily as any motor commonly used in mines.

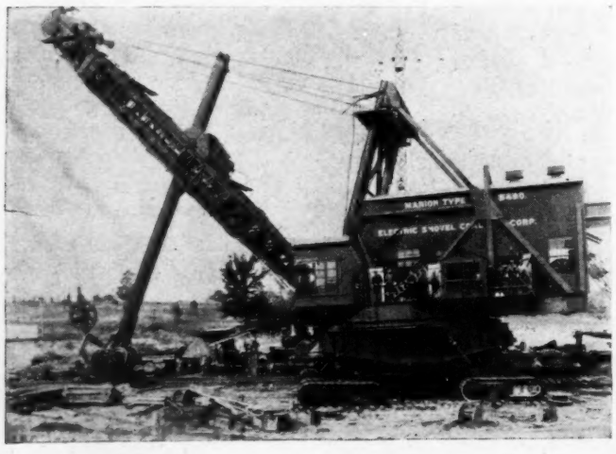
Development of Stripping Operations Shows No Abatement

Evidence of continued feverish activity in opening strip mines is indicated by the accompanying photographs, made Oct. 1 at Winslow, near Oakland City, Ind. Two new 12-yd. electric strippers were caught by the camera during erection. One is now in operation and the other is due to start work about Nov. 20.

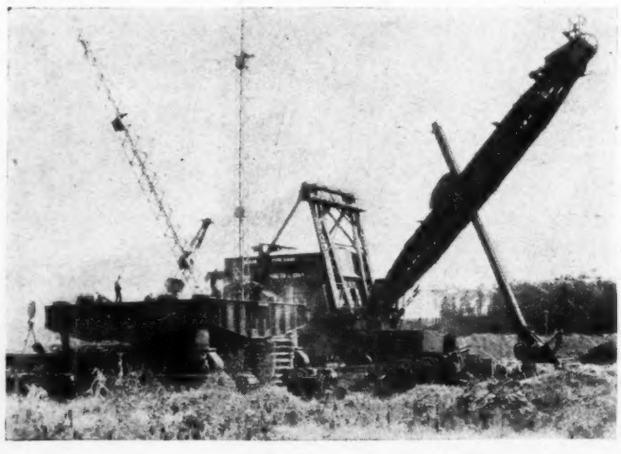
The Electric Shovel Coal Corporation, which is developing this mine, is the company which operates the modern stripping development near Clinton, Ind., that was described by C. C. Balzer, superintendent, in the August issue of *Coal Age*.

So far this year interests represented by the Electric Shovel Coal Corporation and the United Electric Coal Co., the latter having offices at Danville, Ill., have placed orders with the Marion Steam Shovel Co. for ten electric shovels. Eight of these are the 12-yd. strippers and two are the 15-yd. By the end of the year millions of dollars will have been expended in stripping developments.

Unit No. 1 Ready to Make the Dirt Fly



Second 12-Yd. Stripper Takes Shape



Wyodak Strips Hundred-Foot Seam Hydraulically

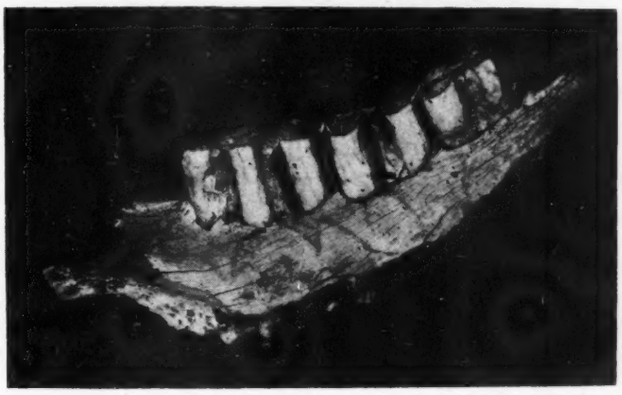
By R. Dawson Hall

Engineering Editor, Coal Age

AT ONLY a few strip pits has the overburden been removed by hydraulic methods. Coal has thus been stripped in the Danville district of Illinois. An attempt was made to do it in the lignite beds of southern Alabama. Here, however, rock was encountered, and it seemed inadvisable to attempt hydraulic operation. In Cayuna range the glacial drift over iron ore was thus removed. Nevertheless, the practice is unusual.

It is strange, therefore, to find a mine in Wyoming, especially in a relatively dry section where the streams for long periods disappear, using the hydraulic method of removing cover, but one mine does with advantage and will continue to do so, at least until the box, or preliminary, cut is completed. The method has furnished an admirable way of disposing of this first cut effectively a long way from the pit and in an advantageous manner. It always is a difficult problem to determine what should be done with the box cut where the coal does not come to the surface or where, as in this case, it is attacked at right angles to the outcrop.

The mine where this method of stripping has been adopted, at the suggestion of Ed. G. Ross, the manager, is operated by a subsidiary of the Homestake Mining Co., which has a big gold-mining operation near Lead, a town located in the Black Hills of South Dakota. The coal corporation is named after the two states thus associated and known as the Wyodak Coal & Manufacturing Co. The mine is located about five miles east of the town of Gillette, in Campbell County, along the Chicago, Burlington & Quincy R. R., and the Custer Battlefield Highway.



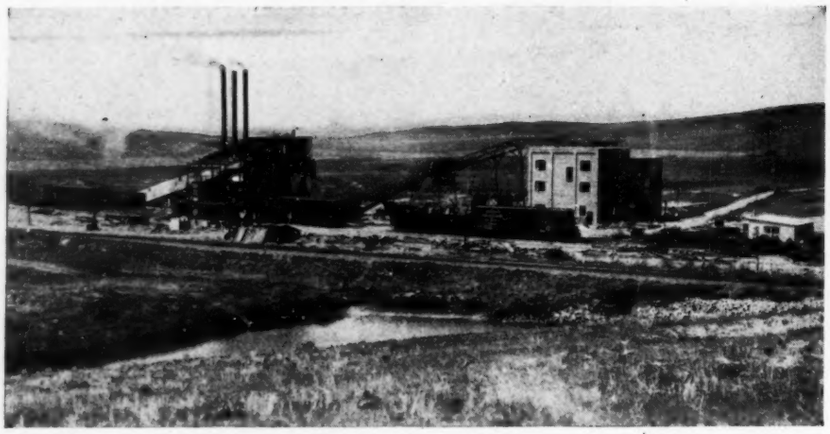
Fossilized Jaw of Bison from Pleistocene Alluvium Over Coal Bed at Wyodak Mine. Probably Bison Occidentalis, a Small Species of the Bison Genus. The Bison Is Popularly but Inaccurately Known as the Buffalo.

The Gillette coal is in the Powder River region and is in a sense an extension of the Sheridan field, though not located in the same watershed. This Powder River field lies in the northeastern corner of Wyoming and extends up into Montana as far as the Missouri River. With the Green River region in the southwestern corner of the state it constitutes one of the two most important coal areas in the State of Wyoming.

The cover is alluvium and about 25 ft. thick. In it are many bison ("buffalo") and beaver teeth and other bones. It would not be safe to venture to identify all the many osseous fragments laid bare by the hydraulic monitor by which the overburden is removed; it is enough to say that they are many and varied. The land of the Wyodak Coal & Manufacturing Co. has been chosen so as to avoid high ground and heavy cover. Some of the adjacent ground is perhaps 50 ft. higher than that at the site of the mine. The alluvium contains some coarse material, but none perhaps of over 6 in. diameter and little indeed of over 2½ in.

The coal is a subbituminous deposit running to a thickness of 96 ft., unusually free from binders except for one 6-in. streak of alluvium about 6 in. from the top of the coal. In hydraulicking this material the monitor loosens and removes not only the main cover but also the upper 6-in. layer of coal and the alluvium below it. So far the greatest thickness of coal uncovered has been 85 ft. The coal thins, of course, as the outcrop is approached.

THE monitor which displaces the cover has a 6-ft. barrel and a 1¼-in. opening. It is working at present at a pressure of about 70 lb. per square inch, which will be increased, however, when the electric power being installed becomes available. The sand pump which removes what the monitor displaces takes all



New Wyodak Tipple Under Construction With Power House on Right

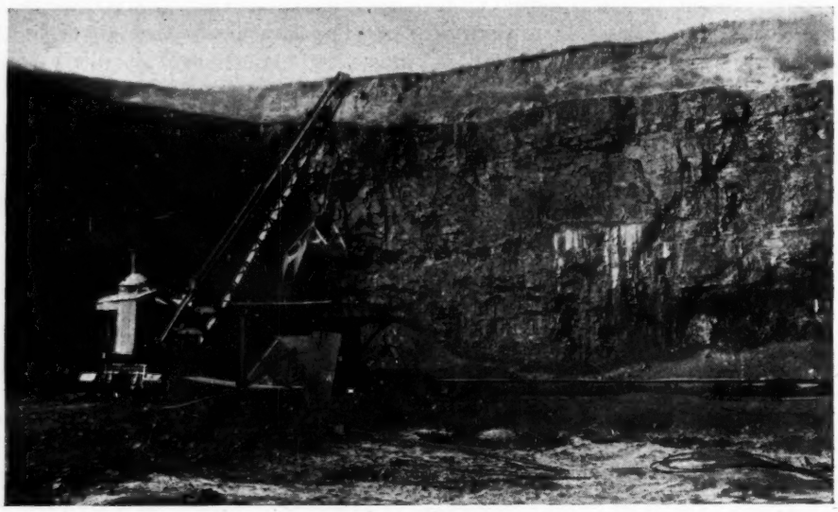
material under 2½ in. diameter, the larger stones being screened out. Because of the severity of the climate the cover can be hydraulicked only from April 1 to Nov. 1. The temperature falls in the winter to 30 and 35 deg. below zero.

After the hydraulicked material has been passed through the 2½-in. screen it is drawn into the suction of a 6-in. centrifugal pump which discharges through an 8-in. pipe a distance of about ¼ mile to the old channel of Donkey Creek, where the water soon disappears, leaving a sand bank all on the company's property and at a point where there is no coal, the seam outcropping between the strip pit and the bank.

Donkey Creek on the map seems an important tributary to the Belle Fourché River, but much of the year it has a sinecure, the water preferring to travel in the gravel which covers the area rather than to run on the surface. The Chicago Burlington & Quincy R. R. diverted the Donkey Creek channel in making its roadbed and the section thus cut off is in part being filled. Earlier, however, much sand was dumped around the plant to form a bed for the tracks and to create a level spot around the tipple.

HYDRAULICKING goes on regardless of the wetness or dryness of the season. Donkey Creek may be as dry as the ancient bones found in its stream bed but under the surface are ground waters which run through the crevices in the coal. Only in an area kept as a sump has the full depth of coal been removed. In this sump a plentiful supply of water always is present as the pit makes about 200 gallons per min.

The coal has a dip of 2 or 3 deg. toward the west—that is, toward the village of Gillette. As it outcrops to the east within the company property and yet can be found further to the east though consumed to an ash bed it would seem that there must be an anticline about where the tipple stands, though apparently its location and trend as yet have not been determined.



Four-Fifths of the Coal Seam; Full Bed Is Removed Only at Sump

The coal is shot with 40-per cent blasting gelatine and drilled with 2-in. electric drills. The holes are sunk about 12 ft. and about 14 ft. apart, the distance, however, depending on the readiness with which the face breaks. A face about 70 ft. high is carried. The other 15 ft. is left at present so that the operations will be free of water. It is in this 15 ft. that the sump has been made. The 70 ft. of face is shot in three layers, first the bottom layer, then the middle and lastly the top layer if it is still in place. The drillers work on the top of the coal that has been shot down.

THE coal is lifted by a Marion No. 37 shovel into a hopper by which it is delivered to a 40-in. belt conveyor. As the coal is thick and the face is 300 ft. wide, the hopper need be moved at only infrequent intervals. The shovel has a 1½-cu.yd. clamshell bucket, operates on a caterpillar tractor and has a 50-ft. boom. The clamshell is provided so that the coal that lies below the 70-ft. face can be mined when necessary and hoisted out of the pit bottom for delivery to the bin and conveyor.

The latter transports the coal to the tipple on a 20 per cent grade. It is about 800 ft. long. At the tipple the coal is sized into lump (6-in. and over), egg (3x6-in.), nut (2x3-in.) and screenings (0x2-in.). The coal contains some fossil tree material, the trunks being 1 or 2 ft. in diameter. It has a brownish cast like much sub-bituminous coal but does not break up on exposure as much as coal of that nature usually does, possibly because it already has had a degree of exposure while lying under the light cover and in the open pit. In the bed it is quite tough and breaks in large blocks.

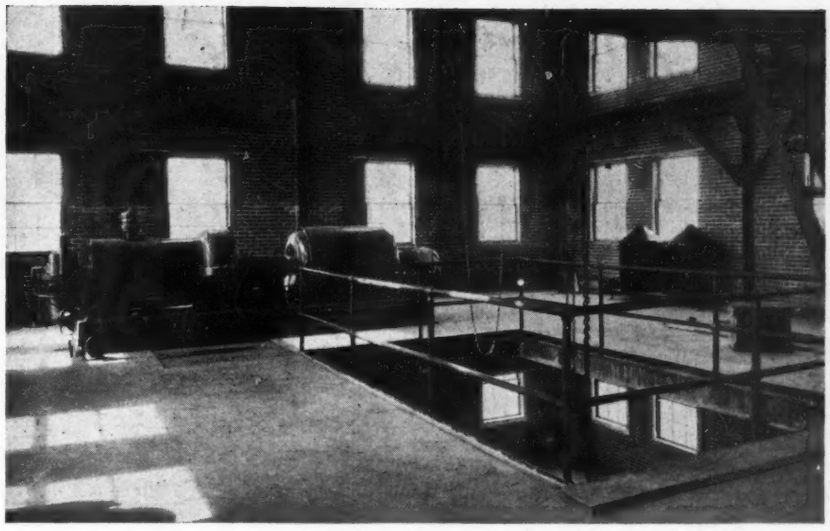
The coal in the Peerless mine nearby runs according to U. S. Bureau of Mines: Moisture, 33.3 per cent; volatile matter, 29.3; fixed carbon, 31.6; ash, 5.8; sulphur, 0.5 per cent. The heating value is about 7,750 B.t.u. This is the coal as it comes from the mine. When air-dried the analysis is as follows, also according to the U. S. Bureau of Mines: Moisture, 18.5 per cent; volatile matter, 35.8; fixed carbon, 38.8; ash, 7; sulphur, 0.6 per cent. The heating value is about 9,470 B.t.u. The latter series of figures shows more nearly the condition of

the coal delivered than the former series. The coal dries out during mining and preparation and on its way to the market.

IT HAS been found unnecessary to hand pick the coal as it is so entirely free from binder. Most of the large coal goes to the domestic market and a large percentage of the screenings is used at the Homestake mines in Lead, S. D., of which this company is, as has been said, a subsidiary. Some of the screenings are being used for raising steam, but a generous electrification project is under way. More screenings will then be used, for more power is needed at the strip pit and current will be supplied to the town of Gillette, which has about 1,200 inhabitants. Perhaps, also, a line will be run to the plant at Lead, which, though distant only 80 miles by airplane, can be reached by railroad only by a detour of 270 miles.

A new steel tipple with machinery designed by the Jeffrey Mfg. Co. and with the structure planned and erected by the Horne Mfg. Co., of Denver, Colo., has recently been built. It has three box-car loaders, all the sizes larger than screenings being sent in closed cars to market. The fine coal is shipped in gondolas. A drag scraper line carries screenings to a new brick power house equipped with two 250-hp. Conley boilers and a 500-kw. Allis-Chalmers turbine.

Some features in the operations possibly will be changed. The width of the face may be reduced to 200 ft. and when the entire face has been removed across the length of the property down to the clay under the coal, the overburden along a parallel strip may be removed by a shovel which will deliver the spoil to a cross conveyor which will in turn dump



Modern Steam Turbine Plant
Being Built at Mine

against the face of the coal on the opposite side of the pit, this coal being needed in its present position for the support of the railroad and siding tracks. It would be well for this bank to have some support which this slope of alluvial earth will provide. One always has to remember that exposed coal may possibly catch fire, as has happened with many lignite mines and croppings in North Dakota and Wyoming.

THE quantity of the material to be stripped is so small as compared with the quantity of coal to be removed that there will be no difficulty in finding a place for it; in fact, the stripping will leave a hole instead of a range of hills, as in other regions. About 200,000 tons has been mined.

A model town has been built in which each house has toilet and furnace and hot- and cold-water piping.

Near this mine is a big pit of the Burlington railroad where the cinders of a bed of coal, prehistorically burned, are being mined for ballast. The ashes have little cover—not more than a foot or so. The slag and clinker at this Minturn pit is dug by steam shovel, crushed and loaded onto cars. It is about 50 ft. thick and makes cheap and excellent railroad ballast.

The Wyoming State Report for 1927 shows that in that year 64,028.05 tons were mined and 17 men employed, working 332 days. Thus the output was 3,766 tons per man and 11.34 tons per man-day.

Foreground: Monitor at Work
Rear: Sand Pump House and Coal Face

Hoisting Ropes Average 44,000 Round Trips

It is only by comparison that the service obtained from equipment can be judged. With a hoisting rope it is particularly difficult to say just what life in tons or trips should be obtained. Much depends upon the judgment of the man who inspects the rope and condemns it for renewal.

The average life per rope for twelve 1¼-in. ropes applied during a period of two years to the hoist at Peabody No. 9 mine, Taylorville, Ill., was 236,000 tons. The shaft is 430 ft. deep, the hoist drive a 1,050-hp. direct-current motor with Ward-Leonard control, and the average weight of coal per car 3.8 tons.

Translated into another form the life per rope was 31,000 round trips of its cage. Adding an estimated 13,000 round trips when hoisting men and material brings the calculated total to 44,000 round trips per rope.

As the equipment is used for hoisting men the ropes are discarded before they show much wear.

Labor's Stake In American Industry

By Edward S. Cowdrick
Counselor in Personnel Administration

MORE than a billion dollars, according to a recent estimate by the National Industrial Conference Board, is the measure of employees' investments under stock-distribution plans of their employers, in the form either of shares owned outright or of subscriptions that are being paid in installments. This estimate takes no account of the additional stock holdings—unknown in amount but doubtless considerable—acquired in their own or other corporations by workers on their own initiative, in the absence of subscription plans fostered by employers.

Now a billion dollars is a lot of money. The very fact that employed men and women can save such a sum is not without significance. Its investment in the business of employers, on terms that make the workers full partners in the enterprises in which they are engaged, is one of the most impressive developments of recent years in industrial relations. Such a situation, quite unexampled in the economic history of this or any other country, scarcely can fail to have far-reaching effects. Even a casual consideration of the subject raises in the mind of the observer a whole series of questions:

What are the causes of the origin and growth of employee stock ownership, and why have these causes operated precisely in the years since the beginning of the twentieth century?

What are the purposes of employers in encouraging workers to become shareholders?

Is labor becoming converted to capitalism?

Is the ownership and control of industry passing into the hands of wage earners?

What will be the effects of employee stock ownership upon the policies of management and upon the relations between management and labor?

Are there dangers latent in the movement, and how may those dangers be avoided?

Among the causes that have led to employee stock ownership perhaps the most important is the increased prosperity of wage earners. American workingmen are receiving higher wages, in terms of money and of what money will buy, than were ever paid to laborers before in any country or in any era. In spite of a standard of living and a lavishness of spending quite unprecedented in the history of the working class, wage earners find themselves possessed of a surplus for saving and investment. Probably national prohibition has contributed somewhat to this result. In any event, the wage earner of today, if he has fairly steady employment and is reasonably energetic and provident, can satisfy the ordinary needs of his family and have something left over.

AT ABOUT the same time that mounting wage levels were becoming an important factor in the business life of the nation the workers were given impressive lessons in investment by the floating of the successive Liberty Loans. This war-time experience made Americans a nation of investors. Once formed, the habit persisted even after the patriotic stimulus had passed. Thus began the era of diffused ownership of industry, which soon became one of the most significant factors in the American economic and industrial system. Corporations began to count their shareholders by the hundreds of thousands. Public ownership, in a wholly new sense of the term, became the established system in many of the largest enterprises.

The wage earners, with their newly acquired prosperity, went along with this movement, sometimes of their own initiative and sometimes with the definite encouragement of their employers. Even before the war period there had been a few experiments with employee stock-subscription plans. In the years of the war and in the period following the armistice these plans were multiplied many times, as corporation after corporation devised methods of aiding its workers to acquire shares.

IN SEEKING to find out the purposes which impelled employers thus to solicit the stock subscriptions of the working forces we should take account of the fact that some managers adopt industrial relations policies for about the same reason that they wear plus fours on the golf links and discard their straw hats on the fifteenth of each September. Just the extent to which this instinct of following the fashion has influenced the adoption of employee representation, pensions, profit sharing and stock distribution it would be difficult to guess. Certainly it has been an important factor.

Among the more logical motives behind the movement for stock distribution, one of the most important is the sincere desire of many employers to help their workmen save money. Behind this desire there often is a genuine interest in the workers' well-being and a desire to help them achieve economic security. To this altruistic sentiment there is added the conviction that the thrifty employee, other things being equal, is more energetic and more reliable than his spendthrift comrade, and less likely to become a charge upon the company or upon the community in the event of illness or forced unemployment. Then there is the question of support in old age—a question that bulks larger every year and attracts increasing attention from labor experts and forward looking employers.

It is realized that the average industrial pension, even in the corporations that have adopted pension plans, is far too meager to maintain the aged worker and his family on any-

thing like their former standard of living. Moreover, a relatively small number of workers never become eligible for retirement allowances. To the extent, therefore, that wage earners make provision for their own support in old age, through saving and investment, they are aiding toward a solution of the problem. Recognition of this fact doubtless has influenced some employers in the adoption of stock-subscription plans.

In addition to their interest in helping their employees save money, many managers have been impelled at least in part by the desire to enlist the workers' interest in the success of the business. Make the laborer a partner, runs the argument of these employers, and he will look upon the business as his own and feel a personal responsibility for improving efficiency, reducing waste and making friends for the company among the outside public. That this argument is not without merit is attested by concrete facts from the experience of some companies. Many examples could be given of the changed attitude of employees once they have become possessed of a few shares of stock. And yet it would be easy to overstress this feature of employee stock ownership. The idea of partnership does not appeal to every wage earner in every company. Some employers, in fact, report that the main incentive of their employees in buying stock is to find a safe and and profitable investment for their money, not to exercise partners' rights and responsibilities in the enterprise.

Among the minor objectives of employers in fostering employee stock holding is sometimes the desire to effect a wider distribution of the voting shares, and thereby make it easier for incumbent managements to retain control. Occasionally also there is the motive of tapping new sources of capital and raising funds for extensions or improvements without costly underwriting or dependence upon bankers.

Without doubt the growth of employee stock ownership indicates a tendency of labor toward capitalism. Other evidences of the same tendency are to be found in the growth of banks, investment companies and life insurance companies backed by trade unions. The industrial worker who owns a share of stock has allied himself to that extent with the capitalistic system. Only by a most extraordinary exhibition of inconsistency could he support communistic theories or other projects for upsetting the existing economic order.

Yet even here the picture ought not to be overdrawn. It is true that the worker who owns stock is to that extent a capitalist and that he is likely to be influenced in his thinking by his partnership in the ownership of industry. His income from dividends or interest, however, ordinarily is a mere fraction of his earnings in the form of wages. If the two interests come into conflict he is tolerably certain to enlist on the side of the pay envelope rather than on that of the dividend check. Too much should not be expected of stock distribution as an influence upon labor's attitude.

With labor becoming capitalistic and with the actual or contemplated investments of workers' savings in the stock of employing companies already past the billion dollar mark are we witnessing the gradual transference of the control of industry to the hands of the wage earners? Probably not. It is true that a few companies already are owned mainly by the people who are on their payrolls. It is perfectly possible that other corporations may pass into this same situation in a few more years; although at this point it is just as well to remind ourselves that the volume of capital investment in industry is mounting rapidly—perhaps more rapidly than employee stock ownership—and that an increase in the absolute total of wage earners' stock holdings does not necessarily mean an increase in their proportionate share of ownership.

BUT EVEN if it were safe to assume that within a measurable term of years the majority of all the industrial and railroad shares in the United States would pass into the hands of employed wage earners, this would not necessarily mean any change in corporation control. With the present diffusion of ownership of stocks in the larger and more important companies, the degree of control exercised by the individual shareholder—especially if his investment is small—is imperceptible. Sometimes he has the choice of delivering his proxy to one or the other of two contesting factions, but if the management is doing a fairly good job and the corporation is paying dividends even this degree of influence is rare.

There is no reason to believe that scattered wage-earning stockholders, even if their collective holdings constituted majority ownership, would get together and oust the officers and directors, even if they thought they had a motive for such action. It is perfectly true that stock plans can be so devised that the employees' shares are held together and voted in a block. Under a very few plans this is what is actually being done. It is not typical of stock distribution in general, however, and shows no sign of becoming so.

Nor should it be overlooked that when we speak of employee stockholders we do not mean exclusively wage earners. Most plans for distributing shares to employees are broad enough to include everyone on the payroll, from common laborers to executives. It is fair to assume that of the billion dollars of payroll money invested or subscribed in employers' enterprises, a good-sized slice belongs to supervisors, clerks,

Promotes Open Door on Policies

With the growth of employee stock ownership there is an increasing tendency of management to give workers information about the business. In fact, it would be difficult to follow any other practice. The employer whose business policies are sacred mysteries will find it wise to worry along without a stock-distribution plan. This spread of information is leading to better understandings between workers and management and is influencing every aspect of industrial relations in companies selling stock to employees.

salesmen, superintendents and company officers, whose interests are considerably closer to those of management than to those of labor.

ALL things considered, employee stock ownership, if it exerts any influence upon control of industry at all, operates to make it even easier for an existing management to maintain itself—already no difficult task, so long as the business is reasonably successful.

But to say that employee shareholding is not likely to transfer the control of industry to the wage earners is not the same thing as to say that it exerts no influence upon the policies of management. A company with thousands of stockholders is tolerably certain to take an attitude toward the small investor quite different from that of the concern whose shares are closely held, and this difference becomes still more noteworthy if many of these small stockholders are employees.

In those circumstances public relations and industrial relations come to mean pretty much the same thing, and management finds itself under obligation to broadcast its policies rather than simply to discuss them around directors' tables. The ultimate effects of this situation would be difficult to predict, but certainly it opens up interesting possibilities. For one thing, wide dissemination of ownership among small stockholders is likely to call for more liberal dividend policies than in the past have been popular with some boards of directors.

In view of all the advantages that have been pointed out, should every corporation which is not already selling its stock to employees proceed forthwith to do so? Most emphatically, no. If there is any policy of industrial relations that holds more elements of potential danger than does stock distribution, this writer has yet to learn about it. The most obvious of these dangers is that of encouraging wage earners to put their money into securities that are unsound.

The employer who contemplates the announcement of a stock plan ought first to ask himself whether, if he were an outsider, he would suggest to a workingman that he invest his savings in the particular stock that is to be offered. For it should be remembered that a "business man's" investment—or speculation—is one thing, while a security suitable for a wage earner is quite another thing. My own opinion is that a company has no moral right to sell its stock—particularly its common stock—to its employees unless that stock is almost in the class that could properly be used for the investment of the estates of widows and orphans. Of course, this bars many corporations—perhaps most corporations—from selling their common stock to employees.

This is unfortunate, perhaps, but it cannot be helped. Many companies which do not have a common stock suitable for distribution to wage earners have preferred issues which are much safer. For those that cannot properly offer even preferred stock, there are other methods of encouraging thrift, through savings plans, credit unions, life insurance or annuities.

Even though the stock offered to employees is beyond suspicion, there is danger that wage earners will be persuaded to overextend themselves and take on obligations that cannot be fulfilled without depriving their families of some of the comforts to which they are entitled. High-pressure salesmanship has no place in the promotion of employee stockholding. Many companies, in fact, set a definite limit—perhaps 10 or 20 per cent—to the proportion of his income which an employee is permitted to invest.

SOME stock plans are drawn up and administered so that they teach the wage earners unsound economics. Usually this is done with the best of intentions—as, for example, when the company agrees to buy back the shares at the price paid for them, regardless of the fluctuations of the market—but regardless of the good intentions the practice is vicious. One purpose of stock distribution is to give the workers an understanding of the functions of capital in industry, and this understanding cannot be otherwise than warped if they are told that they can have the advantages of stock holding without assuming any of the risks.

A stock plan otherwise irreproachable may lose much of its effectiveness, or even meet disaster, if it is launched at the wrong time. As to what constitutes the wrong time, opinions naturally will differ. Certainly, however, it is unwise to offer stock to employees near the culmination of a "bull" market, when in all probability the next tendency of prices will be downward. Some companies have taken measures to protect their stock plans against moderately falling markets, either by selling the shares below current prices or by paying extra dividends or bonuses to employee stockholders.

Employee stock ownership is an important and valuable feature of modern labor administration, and it may have the greatest value to a company which adopts a well thought out plan and administers it intelligently. However, it is not suited to all companies, nor to all times and all circumstances.

Whether to adopt it, and if so when and how, are practical problems to be worked out by each company with a view to its own conditions. It should be remembered, furthermore, that a stock plan is not the whole of a labor policy, but only a part of it, and that it needs to be fitted into the general scheme of industrial relations. It is tolerably certain to fail unless it is joined to other policies that are both liberal and intelligent.

Workers Assume Responsibility of Partners

Wage earners in many companies are taking real interest in the problems of management and are learning to look at economic affairs at least partly through the eyes of the employer. This attitude of labor is influenced by the partnership feature of stock ownership. Numerous instances could be cited of the changed ideas of laborers with regard to efficiency, economy and waste of materials, once they have grasped the notion that a part of the company belongs to them.

MECHANICAL MINING

Enables Elmira Mine To Fight Substitutes

By W. E. Widmer

President, Elmira Coal Co.
Elmira, Mo.

NOT only in the Southwest, but in other fields all over the United States, high cost and the competition of substitutes must be considered by coal producers. Though it has not received the attention of some of the better known fields, the Southwestern field has not been remiss in adopting production methods that will guarantee a product suited to its markets and at a cost that will enable it to compete with substitute fuels. Much time and energy has been spent in developing machinery and mining methods that will reduce the labor required and simplify extraction in the thin seams prevailing in that region.

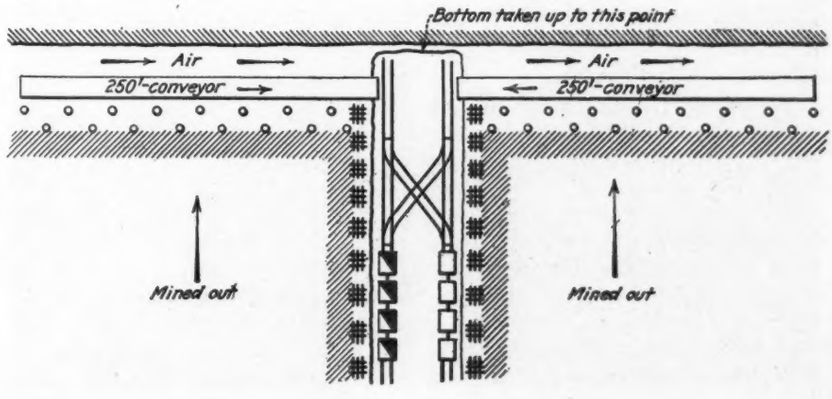
IMPROVEMENT in preparation and production equipment and the installation of modern labor-saving and cost-reducing machinery has long been a policy of the Elmira Coal Co., Elmira, Mo. This policy is deemed doubly necessary because of the keen competition of various substitutes offered in the place of coal. Cost reduction is an essential part of any program to meet this competition and has been accomplished by the development of mechanical devices, some of which have been very successful. Their use also has obviated much of the labor and dead work formerly necessary in the working of the thin seam in which this company has its mine and which forced the officials to look to other mining methods and mechanical loading equipment. The Elmira Coal Co. was the pioneer in the use of modern equipment and methods in the Southwestern field and has achieved very satisfactory results.

The mine is in the Lexington vein, which is reached by a shaft 360 ft. deep. The shaft was sunk in 1919 and the mine began producing coal in 1920. In this locality the coal averages 32 in. in thickness, which is 8 to 10 in. greater than at other places where this same seam is mined. The overburden varies from 300 to 400 ft. in thickness and is composed of rock and slate. Undercutting is done in the fireclay which directly underlies the seam and which in turn is underlaid by rock. The coal is of excellent quality and is well adapted to steam and domestic purposes. Large lumps of a uniform quality coal are produced by the method of mining employed and sold under the trade mark "Elmira Chunks."

A longwall system using independent roadways for each 40 ft. of face was the mining plan first adopted. In 1925, after a very careful and complete investigation, it was decided to change to the conveyor system of loading. A careful study was made of the different types of conveyors and the final selection was made with the special mine conditions in mind. These conveyors are of the drag chain type, 250 ft. in length, and built up of 10-ft. sections. Power is supplied by 15-hp. motors through reduction gears to the discharge end of the conveyors. Six of these 250-ft. conveyors were installed and they operate in pairs, as shown in Fig. 1. The undercutting machines are equipped with 4-ft. cutter bars. Each face then yields about 90 tons of coal per cut. All undercutting is done at night and the coal is loaded out and conveyors are moved forward by the day crew.

As shown in Fig. 1, the entries are not driven in advance of the coal face. Each entry is made wide enough for two tracks and the bottom is taken up to provide height for the mine cars under the discharge end of the conveyor. The taking up of bottom is done at night and the tracks are extended ready for loading when the day crew arrives. By not advancing the entry ahead of the loading face narrow work and the shooting of any coal from the solid are eliminated. There is no entry coal to be mined as the coal on what corresponds to the heading is undercut and loaded out the same as the coal from the walls. Degradation therefore is reduced and this fact is one of the many in favor of this system.

Fig. 1—Plan of Mining; Elmira Coal Co., Lexington Vein



Each conveyor crew consists of an operator who starts and stops the conveyor and assists the car trimmer, one car trimmer who controls the car loading and a conveyor loader for each 30 ft. of coal face. No shooting is required as the coal is broken down by the roof weight. The loaders then break the coal into lumps that can be loaded on the conveyor and take out a middle band which varies in thickness up to 3 in. Care is taken that all lumps shall be as large as possible, the limit being what will pass out between the conveyor and the roof.

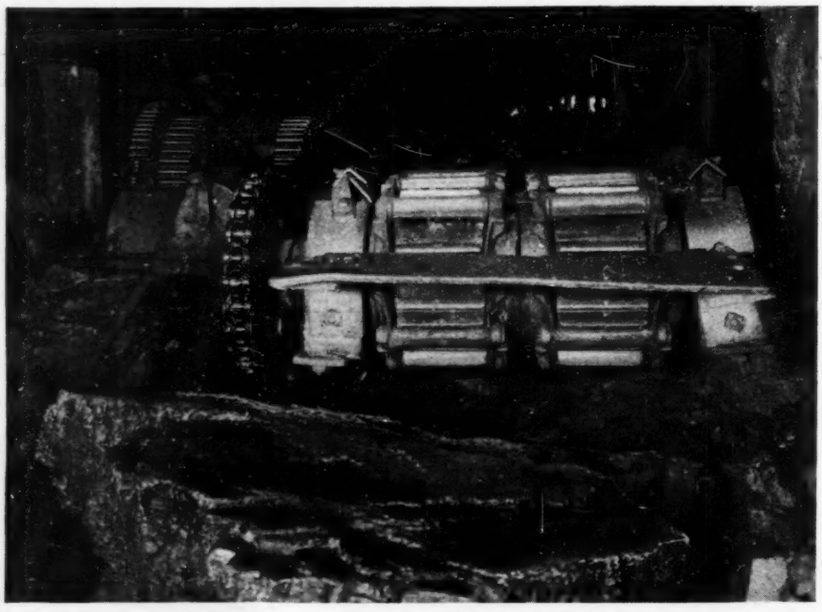
All conveyors are provided with a safety breaking pin attachment to protect them against breakage in case a large lump wedges between the conveyor and the roof. In the majority of cases, however, when a lump strikes the roof the chain pulls under it, cutting it off until it passes on out. The practical and positive features of the conveyor adopted contribute greatly to the success of the system. Shaking or reciprocating type of conveyors were tried but abandoned on account of not being suitable. The present conveyors are reversible for transporting timbers and supplies into the face. In addition rock and brushing from an entry can be taken into the mining area and gobbed wherever desired.

General roof conditions are good with only an occasional loose rock under which it is necessary to set props for the protection of the men. These props are moved forward by the loaders as the conveyor advances. When the coal from one cut is loaded out the conveyor is moved forward as one unit by the loaders with post pullers, the moving usually requiring about 20 to 30 minutes. Cribs are built along the sides of the entry to protect the driving mechanism of the conveyors.

Fig. 3—Bringing Out the Lump

Loading from two conveyors in one roadway greatly reduces the number of roads. Some of the conveyors have been used to load from one side of the entry only, this depending upon other conditions which were worked out to the best advantage. If worked with independent roadways for each 40 ft. of the face now worked by two conveyors at least twelve branch roads with their track would be required. Track work and brushing would be increased and a greater number of cars also would be required. Concentrated loading with conveyors therefore reduces the haulage expense as all the coal is pulled from one point and gathering is eliminated. Ventilation also is simplified as the air is carried along the face and no stoppings or regulating devices are required except doors on the main or loading entries.

Fig. 2—Quick Handling, Face to Car



THE double tracks on the opposite end of the switch from the conveyors are used, one for the empties and the other for the loads. This switch is moved forward occasionally to keep it fairly close to the conveyors and reduce the time required to get the empty car from the empty track or to put the loads on the loaded track. Cars are hauled to the shaft bottom by storage-battery locomotives.

Day labor only is employed and all the men are placed under the sole direction and supervision of the foremen. Sufficient men are put on each conveyor to load the coal and move the conveyor in an eight-hour shift. Upon completion of the loading, moving the conveyor forward and setting necessary props the shift is through for the day.

Fig. 2 and Fig. 3 show the typical entry arrangement and give an idea of the size of the lumps of coal as they come from the face. The conveyors deliver the coal directly into the mine cars without any additional handling or auxiliary car loaders. The conveyors adopted have proved entirely satisfactory and the entire mine has been put on this system.

IN LINE with the other modern machinery in use the mine is electrically equipped throughout. The top equipment consists of a wood constructed tipple with a 150-hp. electric hoist. The tipple equipment consists of all-steel pendulum-type shaker screens for making four sizes of coal, in addition to the necessary loading booms and picking tables. A crusher was installed for making steam or stoker coal, thus providing complete preparation equipment for all classes of trade. The shaker screens, loading booms, picking table, crusher and longwall face conveyors were designed and furnished by the United Iron Works, Kansas City, Mo.

The installation of the conveyor system of mining has resulted in a considerable saving in cost of production as well as an increase in the tonnage per loader with a reduction in the accident rate. By concentrating the work the desired tonnage has been produced without the necessity of keeping open additional and expensive faces. The installation of mechanical equipment in this, as well as other mines of the Southwestern field, has done much to reduce the cost of coal to the consumer, stabilize the business and furnish promptly a product properly prepared to suit each demand.

BILL SEES THE LIGHT

By Philip N. Emigh
Chief Electrician, Byrne Gas Coal Co.
Fairmont, W. Va.

BILL was sleepy. The previous night had been spent in a thorough examination of "Old 97," the three-month-old 20-ton electric haulage locomotive. Armature and axle bearings, gears, brushes, commutators, resistance, wiring, controller, reverse, ground connections, and even the harp and trolley wheel had been gone over as with a fine comb to determine just why the motors heated so badly while hauling only two-thirds their rated capacity.

Bill was a graduate of the mine and had worked at greasing wagons, snapping, running the 10-ton flat road motor, then electrician's helper and finally chief electrician in charge of all the electrical equipment. His work had been satisfactory. To be sure, armatures on the cutting machines and locomotives burned up occasionally, but then "armatures always had and would continue to do that very thing."

Jerry, the genial superintendent, had suggested that the power might be bad, but Bill had denied this. Had they not strung two 4/0 wires from the substation to a point 3,000 ft. underground and were not the rail bonds checked "whenever they had time?" The feed line had been severed at a few places by slate falls, but these had been repaired immediately, using the familiar "coke region" or "hook and eye" splice. They saved time, and "the wire makes contact, don't it?"

RECENTLY an agent had tried to interest Bill in subscribing for a magazine devoted to his line of work. Bill looked over the current number, but, seeing nothing in that particular issue relating to causes of heating in main-line motors, had declined to subscribe, saying he "had not much time to read, and besides he had to buy a new inner tube for his car. This would cost $2, or the price of the magazine."

At noon Bill took his lunch to a cool spot in the substation, sitting on the floor with his back against the switchboard. Gee, how sleepy he

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was! Wished he owned the mine. He'd hire someone else to worry about "Old 97." His head drooped more and more and soon Bill was asleep. Dimly he heard a bang and realized the circuit breaker had tripped out.

AS HE attempted to get to his feet he realized something was wrong—radically wrong. His hands and feet were rapidly shrinking while his body was fast approaching the shape and size of a barrel. All at once he discovered he had no arms or head or legs, while his body looked like a toy balloon magnified several times. Also he seemed to be in a huge tunnel with hundreds and thousands of other similar shapes, all flowing along in one direction as if a strong current of air were carrying them.

Suddenly Bill passed the "Big Switch"; but what was this?—for Bill was up against the roof where the feeder was strung. It took him but an instant to realize that he had, by some freak of nature, been turned into an electron. Likely the tripping of the circuit breaker was responsible. Possibly he had been caught in the arc, burned up, and his soul was entrapped in the heart of an electron and doomed to travel through eternity in this manner.

However, here he was, flying along, pushing those ahead of him and being pushed in turn by those at the rear. Bill felt good—this was sport, no work, nice and cool and nothing to worry about. Presently he noticed a slight slackening in the rush. Those in front seemed in a traffic jam. Bill had to push with all his strength to get through the crowd. All at once there was a twist, a wrench, and an awful squeeze that nearly dislocated his anatomy, and he oozed through a small gate. Dimly Bill saw overhead the "Big Timbers" and remembered that here had occurred the first fall which broke the feeder.

THE crowd was not quite so dense now and poor Bill felt strangely weak and languid. He decided to rest awhile and let the crowd carry him along. But he noticed they were doing the same thing.

Soon there was another squeeze and still another. Bill now was actually sick. He looked like a half inflated balloon, but several of his companions were completely done in and were floating along like dead leaves in a wind storm. A few more wrenches and Bill found himself in the trolley wire; but Oh, what a change! He wanted to curl up in a cozy corner and sleep, but this was denied him.

A dim light appeared down the heading, and as "Old 97" passed under him, he made a flying leap to the trolley wheel, nearly losing his life in the attempt. As he slid down the cable to the controller he wondered why the motorman seemed so worried. It was all so plain now! Bill wished he could tell him where to look for the trouble.

As he passed from the controller finger to the contact he was caught in a sudden blaze of fire that brought an involuntary cry from his lips. "Darn that contact!" said the motorman. "It's arcing again."

BILL whisked on down the wire to the rear motor. His first thought was: "Whew, but it's hot in here! Hope I soon get out." But his hopes were in vain, for as he passed from the brush to the commutator he was caught in a mad whirl through the armature winding, back to the commutator, back through the winding again and again.

Suddenly Bill thought: "So this is circulating current! No wonder she heats up." Bill had heard of circulating current, but, like harmonics in alternating current, it was entirely outside his line of reasoning.

Presently the heavy drag eased off and Bill was able to slip out through the ground wire and down to the rail, which was hard to find on account of the layer of sand which covered it.

Almost immediately he was shunted from his rail, through a water hole, to a 4-in. water-pipe line running to the outside. Bill was past the point where he was suprised at anything, but still he was amazed at how much better he felt. Perhaps the water had revived him and his friends. As they approached the outside Bill began to sing. He felt full of pep, so that presently when the pipe line crossed under the track, he was able to jump the gap with hardly an effort.

Suddenly the substation hove in sight and Bill determined to make a mighty effort to regain his natural shape.

At the same instant: "Ah! Ha! Bill asleep at the switch! I thought when the power didn't come on for a couple of minutes you had dropped off." It was his helper, Jack.

Bill slowly regained his feet. Yes, his hands and feet were there. He had stolen a look to be sure. So it *was* a dream. Said he slowly: "Jack, did you check those bonds in the water hole just above B. Flat?" "Well, chief," said Jack, "I did not exactly test all of them. I thought that as they lay in the mud and water, they were not so important as those where the track was dry."

Bill said, "Suppose you go in and test every one, and if any are loose, drill new holes and put in extra bonds. Also tell the pumper to ditch that water away from there, and tell the motorman a little less sand will be appreciated. I'm going in and solder all those "hook and eye" joints in the feeder, and then we'll see."

At quitting time Bill was more than a little astonished and much gratified to find the motor considerably cooler. Happening to remember an item in the magazine he had not subscribed for, he got a 6-in. piece of lamp cord. Peeling back the insulation for half an inch, he frayed the ends of the wires fan-shaped. Getting Jack to run the motor on one point, he pressed the fan-shaped wire onto the commutator. At the point one brush touched the wire sparked badly. A point was found one-half inch, or the width of two bars, nearer the other brush where there was no sparking.

As sleepy as Bill was he stayed on the job until he had made a new wooden brush-holder support, with the brush holder offset one-half inch. The next day the trips were increased a wagon at a time until full trips were being hauled. Bill was now able to set the circuit breaker back to 75 per cent of what it had been. At the end of the month he found the peak load had dropped 30 per cent, which was very gratifying.

In the ten months since then, Bill has lost no locomotive armatures, also he subscribes to several technical magazines and, strange to relate, has time to read them.

How Well Does It Pay to Treat Mine Timbers?

(Continued from page 669)

of putting the plan into execution. The "out of pocket" or cash cost of initiating the use of treated timber is illustrated by a table similar to the following. The basic figures given are the same as before. Theoretically, after the third year, the cost of treated material would be zero until removed. Due to crush, however, replacements must be made during intervening years. Table V shows that economies start after the third year.

Table V—Annual Expenditures

Years	Untreated	Treated	Difference
1	$635,000	$882,500	+$247,500
2	635,000	882,500	+ 247,500
3	635,000	882,500	+ 247,500
4	635,000	176,500	— 458,500
5	635,000	176,500	— 458,500
6	635,000	176,500	— 458,500
7	635,000	176,500	— 458,500
8	635,000	176,500	— 458,500

Cumulative Expenditures

Years	Untreated	Treated	Difference
1	$635,000	$882,500	+ $247,500
2	1,270,000	1,765,000	+ 495,000
3	1,905,000	2,647,500	+ 742,500
4	2,540,000	2,824,000	+ 284,000
5	3,175,000	3,000,500	— 174,500
6	3,810,000	3,177,000	— 633,500
7	4,445,000	3,353,500	—1,091,500
8	5,080,000	3,530,000	—1,550,000

It is quite feasible to solve the annual-charge formula backward to determine the life required of treated timber to equal any given annual charge. With mine timber cost of $0.6350 per cubic foot for untreated material and a life of three years, and $0.8825 per cubic foot for treated material, it is only necessary to substitute the proper terms in the annual charge formula and solve the equation

$$A = \frac{Pr(1+r)^n}{(1+r)^n - 1}$$

$$0.2375 = \frac{0.8825 \times 0.06(1.06)^n}{(1.06)^n - 1}$$

Solving, $n = 4.32$.

If a life of 4.32 years for treated material is obtained, the treated material will pay for itself. Any life in excess of 4.32 years therefore will result in an economy. Without solving by logarithms, it is apparent from an inspection of the annual charges that an annual charge of $0.2375 (the annual charge for untreated timber with a life of three years) for treated material lies between four and five years (the annual charge for four years being $0.2550 and for five years, $0.2090).

In the same way it is possible to determine the added life which must be obtained in case a preservative costing more than the ordinary types is used. In the computation of economies previously made the cost of preservative was placed at $0.06 per cubic foot. There are preservatives which cost as much as $0.1525 per cubic foot. The total cost of treated material, using such a preservative, all other items being the same, would therefore be $0.9750 per cubic foot. The life required, using such a preservative, in order to equal the annual charge using a 6c. preservative, can be readily computed. Assuming crush factors, etc., to be 20 per cent, as before, the required life of treated material, using the high-priced preservative, to "break even" with the 6c. preservative is determined as follows:

$A = 0.1797 = 20\% \times 0.3646$ (the annual charge for three years when cost is $0.9750) +

$$80\% \ \frac{0.9750 \times 0.06(1.06)^n}{(1.06)^n - 1}$$

Solving by logarithms $n = 9.82$ years.

THE life for treated material using the high-priced preservative must be 9.82 years in order to equal the annual charge on treated material using the low-priced preservative with a life of only eight years. In both cases it is assumed that 20 per cent is destroyed by crush.

The total economies over the eight-year period shown in Table V do not agree with the sum of the annual savings shown by the annual charge formula in Table III for two reasons: (1) In the annual-charge formula, interest at 6 per cent has been allowed whereas in computing the "out of pocket" cost no interest is allowed; (2) in the annual-charge computation the sinking fund set up allows for a continuous process and at the end of the eighth year a reserve has been set up out of economies or profits to provide funds for replacement of timber in the ninth year, whereas in the second case no such fund has been accumulated.

PENNSYLVANIA ENGINEERS *Debate* *Coal Cleaning Methods*

WET and dry processes of cleaning coal were discussed by the mining section of the Engineers' Society of Pennsylvania at an all day conference held in the Blue Room of the William Penn Hotel, Pittsburgh, Pa., Oct. 30, 1928. The meeting was presided over by L. O. Lougee, mining and civil engineer, Pittsburgh, and the morning session was devoted to reading and discussing a paper on "The Cleaning of Coal in the Bituminous Fields of Pennsylvania," by J. B. Morrow, consulting engineer, Pittsburgh Coal Co., and J. R. Campbell, bituminous representative, American Rhéolaveur Corporation, Wilkes Barre, Pa. In the afternoon Charles Enzian, mining engineer, Berwind-White Coal Mining Co., Windber, Pa., read a paper on "Dry Cleaning of Bituminous Coal."

Mr. Campbell, in the morning session, remarked that the purpose of his paper was "to set forth the various types of coal-cleaning equipment used in the bituminous field of Pennsylvania, and the tonnage handled hourly, based on the rated capacity of the plants as furnished by the manufacturer." Included was some equipment, idle because of present market conditions, and pneumatic tables, wet tables, jigs and launder washers were enumerated and described.

"In all wet washing systems," Mr. Campbell stated, "there is the problem of sludge recovery and drying of wet washed coal, just as there is the dust problem in dry cleaning. Perhaps the rational way of handling wet washed coal is to recover the slime in a Dorr tank or an equivalent and, possibly, further dehydration by filters or heat drying."

The capacity of the installations in Pennsylvania is summarized in Table I in the next column.

The total tonnage cleaned by wet and dry methods in Pennsylvania is estimated at 18,000,000 to 20,000,000 tons annually, or about 9 per cent of the annual production for the state.

The preliminary discussion following Mr. Campbell's paper brought out the fact that those present were in agreement on the percentage of coal cleaned in Pennsylvania. Mr. Enzian then inquired if Mr. Campbell had any figures on sludge recovery and the relative costs of different types of wet preparation. Mr. Campbell replied that sludge recovery was about 3 per cent and that the simplest form of plant cost about $400 per ton per hour of daily capacity though sludge recovery might add 50 per cent. Washing costs would vary from 7 to 10c. per ton, not including conversion cost.

Ray W. Arms, of Roberts & Schaefer Co., then remarked that no plant cost under $400 except in special cases. Pocahontas coal might, on account of preponderance of fines, allow the construction of a lower-cost plant. "Fine coal," he continued, "is more expensive to wash than coarse. Increased capacity and efficiency of individual units in air-cleaning plants will eventually place the cost of wet and dry processes on a parity."

GENERAL figures on the cost of a plant could not be given because of dissimilar conditions, was the opinion of W. L. Affelder, Hillman Coal & Coke Co., Pittsburgh, Pa. He further stated that the expense of wet washing could not be justified unless the coal could be converted into a better class. Mr. Campbell replied that this did not hold in inter-company business, where 1 per cent ash reduction resulted in 10 to 15 per cent reduction in the cost of pig iron. Mr. Affelder then qualified his statement to apply to commercial plants in particular.

Table I

	Tons per Hour
Dry tables	3,080
Wet tables	2,150
Jigs (all types)	720
Chance separators	300
Rhéolaveur	1,100
Total	7,350
Total commercial capacity	3,060
Total metallurgical capacity	4,290
Total	7,350

Two or 3 per cent excess moisture in wet washed coal was the figure set by Mr. Campbell in response to an inquiry. Mr. Enzian asked if the wet process was confined to over $\frac{3}{8}$-in. coal, to which Mr. Campbell replied that in a complete plant natural drying was resorted to in sizes above $\frac{3}{8}$ in., centrifugal dryers were used for coal from 28 to 48 mesh and centrifugal dryers or heat for sizes below 48 mesh. The amount of moisture would be relatively less in sizes over 4 in.

The effect of excess moisture on coking properties was then pointed out by C. H. Dodge, H. C. Frick Coke Co., Scottdale, Pa. Mr. Campbell replied that plant operators usually considered 5 or 6 per cent as satisfactory. Mr. Arms then stated his company found that Southern ovens operated at a higher moisture content, that railroads considered coal wet which froze in the car and that wet coal in dry cleaning was that which gave trouble with the fines.

Moisture is considered as much an inert material as ash by the Youngstown Sheet & Tube Co., F. A. Jordan remarked, 1 per cent being considered the equivalent of 0.7 per cent ash.

RELATIVE moisture contents, said Mr. Enzian, must be applied on the basis of the origin of the coals whether Pittsburgh or Allegheny (central Pennsylvania), as the latter group tends to take up much more water. Dry cleaning leads in central Pennsylvania because of the necessity of cleaning a large amount of fines which would otherwise present a serious problem in sludge recovery. Mr. Campbell then stated that the plant loss would be the de-

ciding factor and that Pittsburgh coal was not as amenable to washing as the lower measures. Crushing the coal does not help, the solution being to wash it in a large range of sizes at a low gravity.

No process, stated Mr. Affelder, would then accomplish anything not indicated by sink-and-float tests. Mr. Campbell and Mr. Arms agreed and then emphasized the importance of washing gravity, Mr. Arms going further to point out that coal is not a homogeneous substance. To obtain a pure coal a large amount of a middling product would have to be disposed of. In the long run the standards of the trade will govern cleaning and the future probably will see closer adherence to the washability curves.

"Progress in mining and utilization require that the operator mechanically and physically clean his product for the market, selecting a process which will yield a product possessing a physical and chemical quality demanded by the market," stated Mr. Enzian in opening the afternoon session. "He must face, then, the economical and physical limitations imposed by the location and the character of the product produced by his mine."

PRELIMINARY research into the chemical and physical character of the mine product and the chemical composition of its various components together with the variations usually existing as between sizes or groups of sizes was then taken up by Mr. Enzian. Such a program will involve sampling of the coal at the face and in the car, screen tests, float-and-sink studies, chemical analyses, the intimate characteristics, both physical and chemical, of the impurities to be removed and the setting up of washability curves to determine the results that may be obtained in commercial practice, especially as to the possible weight loss, or "rejects," which are an important element in the cost of operation.

Upon conclusion of the research outlined above the next step is to actually test the coal in carload lots to determine the practical results which may be obtained in a commercial plant. From the washability curves already obtained and the data from the actual tests the effect upon the resultant marketable product of weight loss, gravities of impurities, breakage in pre-handling the raw product, changes in the physical characteristics due to breakage in screening, tabling and rehandling may be determined.

The pneumatic process, Mr. Enzian continued, may be divided into the "composite" or "integral" systems. The former eliminates prescreening, a highly desirable point where friable coal is produced. It also is desirable in the smaller plants, because of its simpler nature. It is, however, not as generally applicable as the "integral" system now employed in one operating and one proposed plant of the Berwind-White Coal Mining Co., near Windber, Pa.

The operating plant has a capacity of 400 tons per hour and separates the run-of-mine coal into these eight sizes:

Size in Inches (Square Mesh)	Range of Total Quantity, Per Cent
+ 3½*	2.50 to 16.50
3½x1½	3.75 to 12.00
1½x1¼	4.00 to 5.00
1¼x½	4.00 to 5.00
½x¼	6.00 to 7.00
¼x⅛	17.00 to 18.00
⅛x3/16	16.00 to 19.00
3/16x0	27.00 to 46.00

*Round mesh.

The coal above 3½ in. is hand picked and one table is used for the next three sizes, aggregating 16 per cent of the product. Two tables are required for each of the next four sizes. In a representative test the ash reduction from hand picking was 4 per cent as compared to 40 per cent for the entire tipple and separator. The various figures connected with operation of the cleaning plant include a power requirement of 1.76 kw.-hr. per ton; total cost of plant $940. per ton per hour; 6 per cent increase over previous mine costs; average ash and sulphur reduction, 20 to 35 per cent respectively, and reject on weight loss basis 5 per cent.

IN THE new plant—of the same capacity—the coal over 4 in. is hand picked, that from 4 to 1½ in.—about 16 per cent—washed in a Menzies hydro-separator, and 1½ to 1 and 1 to 1½ in. cleaned on one Arms table each, the ½x¼ in. and ¼x⅛ in. on three tables each and the ⅛x0 in. on four tables. Very friable coal, small sizes and likelihood of freezing limit the plant in the main to dry separation. The probable ash and sulphur reduction and mine weight loss are respectively 20, 31 and 4.5 per cent. The plant cost, including Pangborn dust collector, is approximately $1,003 per ton per hour of daily capacity. The anticipated advantages include a smaller operating force, modern tipple, dry product of uniform quality, elimination of dust and reduction of impurities as outlined above.

In the discussion following the reading of the paper Mr. Enzian stated in reply to queries that moisture decreased efficiency of the dry-cleaning process because of inefficient sizing and increase in gravity of the coal, that it is usual to clean down from larger to smaller sizes, that ash reduction in hand picking was 2 to 4 per cent and that increase in fusion point temperature was about 400 deg. F.

In considering conversion costs, Mr. Campbell remarked that the extra coal mined to make up the loss would carry only about two-thirds the cost of the rest, the remaining one-third of which might properly be credited to conversion cost. Remarks by others present were to the effect that the problem of conversion costs was not so easily solved.

Mr. Arms then stated, among other remarks, that "the proper place to begin to prepare coal was at the face." He then discussed the removal of dust from an air cleaning plant, stating that the problem was that of handling the volume of air passed through the plant rather than the amount of dust it carried. Re-circulation is largely depended upon to reduce the quantity of air and consequently the power required.

IN CONVERSION costs, remarked Thomas Fraser, Carnegie Institute of Technology, the decrease in cost of the extra tonnage mined credited to conversion would justify the cost of the plant. Further discussion by those present qualified this statement, holding that it is true if no extra labor is required. C. E. Lesher, executive vice-president, Pittsburgh Coal Co., Pittsburgh, Pa., then stated that the extra cost of cleaning commercial coal was recovered in the price of the product.

Following some remarks on decrease in power as a result of decreasing the air circulated through the plant, Mr. Affelder suggested that screening before cleaning be discussed. Comments on the question indicated that present practice consisted of removing the large sizes first to decrease the burden on the screen and reduce degradation, and that pre-screening is not essential where wet processes are concerned. Mr. Enzian, in reply to a query, stated that uneven loading would adversely affect the operation of the air tables.

MACHINE LOADING

Steadies Output At Scott Mine

By M. H. Haymond

Superintendent, Scott Mine
Bethlehem-Fairmont Coal Co.
Shinnston, W. Va.

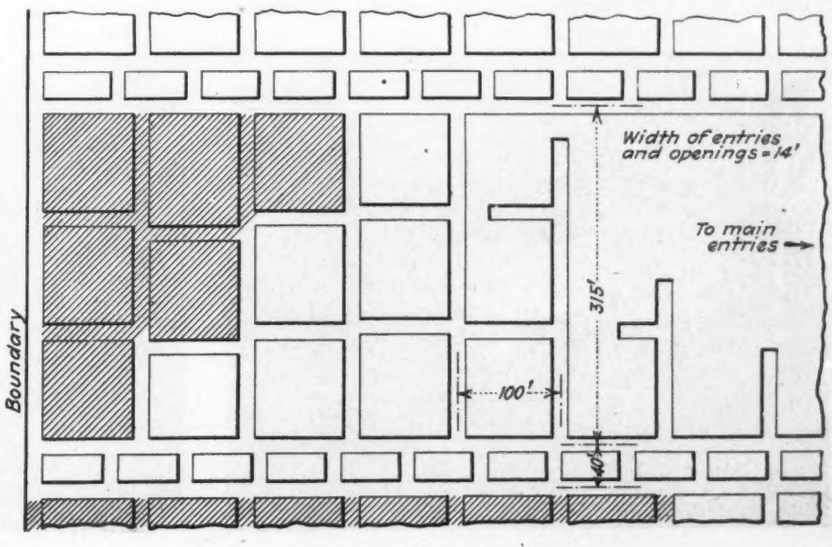
FOUR Joy loading machines are consistently producing an average of better than 440 tons per day at Scott No. 2 mine, Bethlehem-Fairmont Coal Co., Shinnston, W. Va. These machines have been working for a period of four years, and their unfailing operation is a tribute to the careful planning that makes it possible. In accordance with this principle the mining plan is designed for maximum concentration of work, and a sufficient number of places is kept at all times to assure full production on every shift. In addition, an extra machine is kept on hand to substitute for any that may break down or be brought out to be overhauled. A system of inspection and periodic overhauling results in a maximum of service from each machine.

Scott No. 2 mine is in the Pittsburgh seam, 7 ft. of the total thickness of 8 ft. being mined. The other 1 ft. is of relatively poor grade and is left in place to furnish protection for the roof. The characteristic drawslate overlying the Pittsburgh seam appears in the Scott mine but is easily controlled, while the bottom is made up of firm fireclay, which gives no trouble.

The mining plan is based on the use of large blocks, a characteristic of the majority of systems used in the Pittsburgh seam. Six main entries penetrate the coal area. Room entries are then turned at right angles and driven to the boundary, no rooms being turned until the entry is completed. Room centers are 100 ft. and they are driven about 300 ft. deep. The rooms are finished when they break into the aircourse of the succeeding entry and pillar removal is started immediately. All rooms and breakthroughs are driven 14 ft. wide.

Two purposes are served by the Joy loading machines. They may be used either to effect quick development by rapidly advancing an entry or to drive up the rooms and draw the pillars. Each machine, whether on pillars or on entry work, is put on a section of its own and

Fig. 1—Mining on the Retreat; Block System



where enough places for a full day's production are always available. In ordinary operation each machine will clean up an average of four to five places of about 25 tons per place in a shift. However, to insure steady operation, each machine section has at least six places available, so that any fall of roof, track or mechanical difficulties in any one will not result in a loss of production during that particular shift. In addition, the places are concentrated in as small an area as possible to reduce the time consumed in moving from one to the other.

Five men comprise a crew, which consists of two operators, a shotfirer who also lays the track and two mining-machine operators. A motor is assigned to each machine and carries with it a motorman and a brakeman who also acts as a car trimmer and signal man.

All cutting is done on the day shift with shortwall cutting machines mounted with power drills. In driving openings the place is undercut 7 ft. deep as soon as it is cleaned up, the machines making their own bottom. The shotfirer then does the preliminary shooting and lays up the track, after which the place is ready for the loading machine. The machine is trammed in and run up on special blocks for the removal of the wheels. It then proceeds to the face and loading begins.

IN ORDER to obtain lump coal a special system of shooting has been devised. Five holes are bored in each cut. Three of these are in a row along the top of a 14-ft. cut and the other two are placed, one on each side, 4 ft. from the center and about 3 ft. above the undercut. The two lower holes are shot by the shotfirer to prepare the place for the machine. This coal is then loaded out, leaving a large free space in which the machine crew shoots the rest of the cut. Firing the top row of holes gives a quantity of lumpy coal which can be easily loaded.

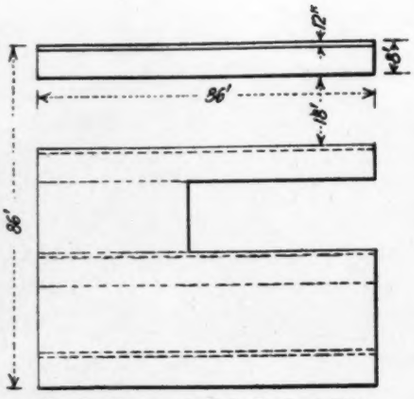


Fig. 3—Removal of Individual Pillar

Cars are brought to the machine in trips of 12 to 14—just enough to clean up a place. Each car has a capacity of 2 tons and 12 ordinarily finish a 14-ft. place. A soon as the machine is in loading position the front car of the trip is shoved under the boom and loaded. When this is completed it may either be set ahead on the entry track or placed in an adjacent room. When the place is finished the motor takes the trip to the side track while the machine is being trammed to the next. In this way the time lost in waiting for cars is reduced to the minimum.

The above system has been found best for obtaining the greatest production. An attempt was made in the past to lay track into every breakthrough in rooms and entries. It was found, however, that the gain in time was not sufficient to offset the extra cost. Another method, which also was found to be unsuitable, consisted in double-tracking the rooms. A special switch which was picked up bodily and carried forward as the room advanced was used. Loaded trips were then made up on the extra track. As neither of the above methods proved to be satisfactory they were discarded and at present cars are changed into adjacent rooms or into every other breakthrough in entry driving.

THE general system of pillar removal, which is shown in Fig. 1, consists of a retreating system in which rooms are driven only as needed. Individual blocks are removed by the machine as shown in Fig. 3. The blocks are approximately 86x86 ft. and are divided up by driving three pockets through them as shown. Upon completing the first pocket, a rib of coal 8 ft. thick is left against the gob. This rib is then slabbed 7 ft. deep for its entire length, leaving a 1-ft. curtain of coal next to the gob. The slabbing cut is loaded out by the Joy machine and the remaining 1 ft. by hand loaders. This method enables the operatives to secure a maximum of machine-loaded coal with the greatest possible protection against falls.

Four years of steady operation is ample proof of the practical value of the system in use at Scott mine. The average daily mine production is 1,750 tons, of which 440 is sent out by the Joy machines. The latter could be considerably increased at any time if desired without changing the existing plan of mining, as the concentration of loading places and the careful attention to the upkeep of the machines readily lend themselves to an extension of activity.

Fig. 2—Face After Firing Block Shots

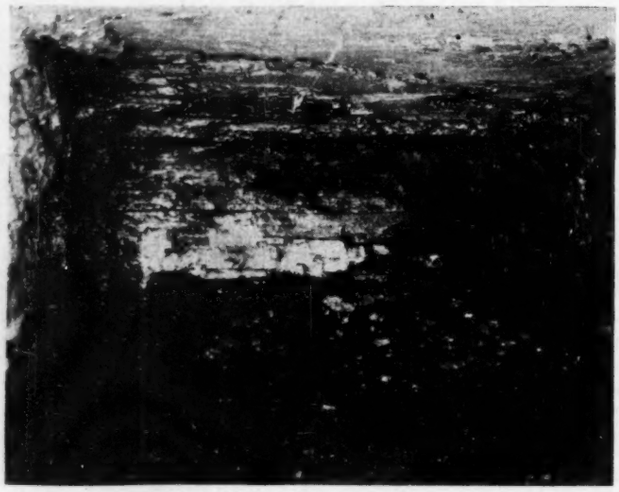


Fig. 4—Loading Out Block Shots

Turning Losses Into Profits By Proper Accounting

By L. L. Stender
Huntington, W. Va.

IT IS the small leakages that are most dangerous to the life of an industry because of the difficulty of detection. The difficulty in proving to the management that losses are really serious is due to the volume of auditing and analysis required in ordinary bunglesome accounting and cost systems. However, if a simplified system of analysis and control is in operation, such losses are uncovered, or at least made discernible to the experienced accountant, without the necessity of detailed checking.

The president, treasurer and other officials of any large organization, from the very nature of their positions, are far removed from direct contact with the handling of the multitudinous details making up the accounting structure. First-hand knowledge of actual conditions, except in rare cases, is improbable, unless the facts are brought to their notice by intelligible reports in the most condensed form. Even then, the significance of the salient features may be missed.

The small losses in the mining industry may occur in many forms, all of which may be minimized or eliminated. Chief among these are those occurring in the payroll and time-keeping department.

THE payroll office, in some form or other, handles through the payrolls approximately 70 per cent of the cost of mining, and the volume of items is greater than in all other departments. The items in most cases are for small sums. It is obvious, therefore, that small leakages in the several operations will amount to a large sum in the aggregate.

In coal mining the time-keeping usually is done by the various foremen. Furthermore, this work falls on them near the close of the day when they are weary and about ready to quit. It is not surprising, therefore, that time-keeping is given secondary consideration. Nevertheless, a proper system of analysis and control will reveal many of the existing leaks and justify the accounting department's demand that this work be given the attention its importance warrants.

Leakage may occur by duplicate payments for "time." For instance, an employee may be working under more than one foreman during the same pay period or even during the same day, and several foremen have been known to give an employee "time" for the same period. Each foreman—under most systems—is allotted certain payroll numbers for his employees and the name of the employee is therefore carried on different sheets of the payroll, and the double credit is not discovered by the payroll office. The employee who is short complains and his shortage will be made up, but no recovery is had from the employee who is overpaid. Errors in calculations and extensions will result in similar losses. Under a system of analysis and control properly carried out the discrepancies are readily located.

DISHONESTY may result in losses. Padding of time books by foremen or payrolls by clerks; extra loading checks or weights given by the superintendent, weigh boss or dump boss and back hand labor charged to the company instead of the contractor may be eliminated by a proper control system which makes padding in the payroll office impossible without the collusion of at least one other department.

A systematic and exhaustive analysis of costs will disclose much waste that is not clerical but due to lax supervision, the chief items in this classification being:

(1) Collections over the payroll are improperly charged or left off entirely. These consist of rent, lights, fuel, insurance, haulage charges, scrip merchandise orders, overdrafts from previous rolls and other items. Even though such errors are later discovered the employee may have left the employ of the company and the account be lost.

(2) Charges against employees may not be transferred from one payroll office to another.

(3) Employees may be allowed to overdraw by excessive issue of scrip and lax rent collection, or their identity be lost when shifted to other jobs by misspelling of names.

CONSIDERABLE experience enables Mr. Stender to speak with authority. He had been a public accountant many years before 1920, when he became auditor of the Main Island Creek Coal Co., now merged in the West Virginia Coal & Coke Co. Here his duties consisted of reorganizing and revising the accounting methods in the departments of mine time-keeping, payrolls, cost, stores, tenements and employment. Before his connection with the coal company Mr. Stender did the actuary work and helped organize the West Virginia Workmen's Compensation Department.

(4) A proper check may not be made to see if there is an employee working for each name on the time records.

(5) Payment for loading may exceed the coal dumped into the railroad cars if each day's and each month's dumping be not recorded and verified.

(6) Back hand labor may be charged to the company instead of to the contractor, through accident or design.

(7) Improper or careless handling of incoming merchandise and supplies may result in paying for articles not received as well as the payment of freight and express on such items.

(8) Accounts may not be kept in such manner as to make possible the location of and the reason for excessive costs.

(9) Supplies may be wasted by improper receiving and charging out.

(10) Railroad cars of coal may be lost and no recovery made.

SOME operators look on the cost department as a place to ascertain cost of production for the purpose of establishing a sales price, instead of a means of furnishing the management with valuable information for use in an intelligent effort to curtail useless expenditures. Cost figures have little to do with establishing the selling price, that being regulated by market conditions. Therefore, the cost is in reality regulated by the selling price. An intelligent use of the facts on record in the cost department will considerably increase the efficiency of operation of the managerial department, and will make cost account-

ing a worth-while branch of every organization.

The adoption of an accounting system may be a problem of considerable moment. However, all companies having a good method of accounting and analysis have accepted as facts that: (1) A system to operate successfully must above all else be practicable; (2) must furnish the management with useful information in the most concise form; (3) provide that the various persons responsible for expenditures for labor, supplies and other items be informed as to the amount of expenditures in their several departments and supply comparative statements for their consideration; (4) suggest to both executives and heads of departments possible means of reducing expenditures and increasing efficiency; (5) must make the office the nerve center of the organization and (6) fit the business.

Finally, the departments must be properly co-ordinated. No matter how efficient each department may be in its own operation, if it is not so co-ordinated as to harmonize with all other departments the results will be unsatisfactory and the benefits of an accurate day-by-day check will be lost.

Pump Efficiency Figures May Be Misleading

THE efficiency of a machine which has for its purpose the transfer or transformation of energy is defined ordinarily as the ratio of the energy output to the energy input. The energy input of a centrifugal pump is the energy applied to turning the shaft, while the energy output is calculated as the volume of fluid handled multiplied by the increase in pressure generated or as the weight of fluid multiplied by the head pumped against. The total mechanical energy of a fluid, however, includes pressure head, elevation head and velocity head, all of which items must be taken into account, says George H. Gibson, consulting engineer, New York City.

The gain in pressure is readily measured, but the remaining item, velocity head, sometimes is overlooked or misunderstood by the pump user. Velocity head is the vertical distance in which a freely falling body would gain the velocity being considered, and is equal numerically to the velocity in feet per second squared, divided by twice the acceleration of gravity in feet per second per second.

The velocity of the fluid in the suction or discharge nozzle of a centrifugal pump can be readily calculated. If the areas of the suction and discharge nozzles are equal there is no correction for velocity head, but if one is larger than the other the difference in velocity head is added to, or subtracted from, the pressure head developed by the pump, accordingly as the discharge nozzle is smaller or larger, respectively, than the suction nozzle. The rule in the "Standards of the Hydraulic Society" reads:

"If the discharge pipe is of smaller diameter than the suction pipe, which is often the case, then it will be necessary to add to the total head, as shown by the gages, the difference in velocity head between that of the discharge and that of the suction pipe at the points where gages are connected. If the discharge pipe is larger than the suction pipe, the difference in velocity head must be subtracted from the total head."

From the point of view of energy transferred to the water in the pump, this rule is correct in theory, but it can lead to considerable error in evaluating the practical utility of a pump. The piping connections also should be considered. Suppose that bids are asked on a pump of 18 in. nominal size to deliver 9,000 gallons per minute against 35 ft. head, and that one manufacturer, figuring on a pump with 18-in. suction nozzle and 18-in. discharge nozzle, guarantees 82 per cent efficiency, while another manufacturer, offering a pump having an 18-in. suction nozzle and a 16-in. discharge nozzle, guarantees 82.5 per cent efficiency.

Which is the better pump, other things being equal? It is assumed that on test each pump will show exactly the efficiency guaranteed. The pump credited with the higher efficiency, however, gets credit for its efficiency by virtue of a velocity head correction of $\frac{(14.4)^2}{(64.4)} - \frac{(11.4)^2}{(64.4)}$ = 1.2 ft., 11.4 ft. per second being the velocity in the suction nozzle and 14.4 ft. per second the velocity in the discharge nozzle. The question before us is, does the customer receive the full benefit of this velocity head?

In probably 95 cases out of 100, moreover, the pump will be installed with the discharge flange bolted directly to an elbow to connect with a pipe extending vertically upward to the ceiling or downward through the floor. The friction of a 90-deg. ell is commonly figured as equal to that of 50 ft. of straight pipe, on which basis the pump with the 18-in. discharge nozzle will have a loss through the elbow of 1.63 ft., while the pump with the 16-in. discharge nozzle will have a loss through the elbow of 2.85 ft. The loss with a 16 x 18-in. increasing ell would be almost as great, because there would be practically no conversion of velocity to pressure in the elbow. There is accordingly an increased loss due to the use of the 16-in. discharge nozzle of 2.85 ft. — 1.63 ft. = 1.22 ft., or 3.48 per cent of the total head developed.

The customer similarly pays an excessive price for a small discharge nozzle where a check valve is bolted directly to the pump flange, as is frequently done. At high velocities, friction losses through check valves are considerable.

In other words, the customer should consider the complete installation, including the piping arrangements which will be used with the pump, when comparing efficiencies, and he should bear in mind that a pump having the proper size of nozzle may give a greater useful effect, even though its guaranteed efficiency is lower. This applies particularly to low head pumps, where the velocity head constitutes an appreciable part of the total head.

As the velocity in the pump volute always is much higher than in the discharge nozzle one of the problems of the pump designer is to convert this high velocity into pressure as efficiently as possible, but it is easier for him to leave the velocity high clear up to the discharge nozzle, especially if he can persuade the user to give him credit for the entire gain in velocity head between suction and discharge nozzles.

The better showing made by the pump having a small discharge nozzle will be more than offset by loss in the piping unless an efficient straight increaser is put in between the pump discharge flange and the pipe line. Unless this could be done the pump with 18-in. discharge nozzle in the above example would be much preferable to the pump with 16-in. discharge nozzle.

In any event a pump which has a discharge nozzle smaller than the suction nozzle should not be given full credit for velocity head in comparing it with a pump having both nozzles of the same size, since it is impossible to convert 100 per cent of the velocity into pressure, even with the best piping layout. In most installations, as a matter of fact, no effort is made to obtain efficient conversion of velocity head into pressure.

Time Studies Give Facts; Observation Only Opinions

By R. R. Knill
Assistant Inspector, Mechanical Loading
Union Pacific Coal Co.
Rock Springs, Wyo.

A TIME study is the recording of each operation together with the time of day or the total time expended during a work period, but when only the latter is obtained the information fails to show when each piece of work was done and to what extent one operation overlapped another. The studies used by the Union Pacific Coal Co. are of the former type, being records of the operation together with the time of day, so that the details of performance may be followed from starting to quitting time by referring to the graph on which the study is taken.

Time studies should be intelligently and fairly taken and interpreted in the same manner. Where the capacity of a machine, the rope speed of a hoist or the average time of a motor haul is wanted, one study will suffice although better results and more exact information will be obtained when several are taken. To ascertain the causes of delays or to plan future operations a different system should be used.

When the first study is made the more serious delays are brought to light and some idea is obtained as to the capacity and adaptability of the machine. The study should be used to correct these delays and possibly to change the system or add some additional equipment, reduce or increase the crew or do other things that appear likely to aid the performance of the unit. Then after ample time to get full advantage of the corrections other studies should be made to observe the results of the changes, noting where they have helped or hindered. These studies should be repeated till the unit works smoothly.

Around the coal mines analyses have been made on the man-minute and machine-minute basis, each having different uses. Where both can be used the best results will be obtained. The man-minute system is shown in the upper graph. The paper should be long enough to show a half day's operations. Lines running horizontally show the task at which the man is working and the number at each vertical line shows the number of men doing the particular work at that time. The spaces between vertical lines represent single-minute intervals.

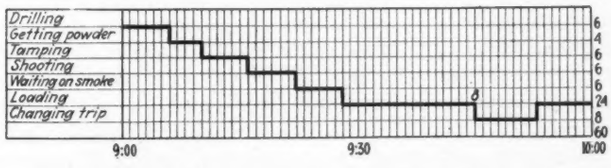
At the bottom the item "conveyor running" shows the actual time used to load each car. The number at the break in the line shows the number of cars loaded up to that instant of time. The times at any particular kind of work multiplied by the number of men performing them are added to one another so as to get the time in men-minutes. These totals are recorded on the right. From these totals for the day can be derived the average times needed to change a car or a trip or to remove the conveyor from one room to another.

This type of study can be used to chart work performed in the operation of a tipple, the larger partings and primary and secondary haulage; but to ascertain coal-loading time by conveyor or other mechanical means is its principal use.

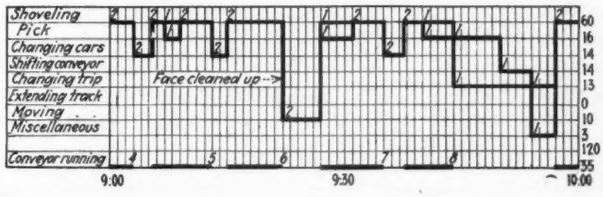
The lower graph shows the study by machine-minutes, and in practice vertical lines are provided showing these intervals of time. These forms of study may be used to compare performance of crews or of operatives, to show the lack of co-ordination of machines and to make clear under just what difficulties the men may have to work.

Article read before Rocky Mountain Coal Mining Institute.

Man-Minute Graph



Time Chart Showing Machine-Minutes



Hazards of Electric Wiring Pointed Out by Bureau

One of the biggest problems confronting the safety engineer is how to obtain reasonably safe electric wiring in a modern coal mine, according to the U. S. Bureau of Mines. It is continually facing this problem in carrying on its program of testing equipment submitted for approval as "permissible." How to safeguard that portion of the mine in which electric wiring is immediately associated with approved equipment is constantly becoming a more difficult question to solve.

Under normal ventilation the wiring offers mostly minor hazards, but let the ventilation be stopped or the normal course of air be diverted and the electric wiring may threaten disaster to the whole mine. Some steps to reduce this hazard are:

(1) Manufacturers have adopted rubber air hose for protecting the wirings of battery locomotives and other machines instead of metal conduit, which is easily damaged and weakened; (2) approval plates are now worded to require the proper making and vulcanizing of splices in trailing cables; (3) fuses or other suitable automatic circuit breakers are required; (4) field and laboratory studies are being made to discover factors that make for the greatest safety in their use.

Even with this there is still a grave question as to whether trailing cable will ever have as high a degree of safety as a motor or other piece of electrical equipment that has passed the Bureau's inspection and test.

COAL AGE

Published by McGraw-Hill Publishing Company, Inc.

JOHN M. CARMODY, *Editor*

NEW YORK, NOVEMBER, 1928

In the right direction

RECONSTITUTION of the Illinois coal operators' associations into a body dedicated to the task of promoting sound industrial relations is a move in the right direction. Other industries starting out with labor situations no better than, if as good as, those existing in the coal industry at the present time have been able to develop relationships in which strife has receded farther and farther into the background and a real partnership of interest has taken the place of warfare. There is no reason why the coal industry should not do as well; the results achieved where an honest and continuing effort has been made are an earnest that it can.

Emphasis is placed upon continuing effort because too often contacts have been intermittent. The labor organization, it is true, has been on the job every day, but consideration of industrial relations in their broadest aspects has been a part-time job for many employing executives. Successful relationships cannot be built upon intermittency—especially when the contacts generally are made only when the tenuous relationships existing are further imperiled by dissension. What is needed is breadth of vision and breadth of sympathy combined with increasing study of and contact with the problems of harmonizing clashing wills and divergent viewpoints. The organic structure and the directing personnel of the new Illinois Coal Operators' Labor Association hold bright promise that this consummation will be effected.

Inspectional specialization

COAL companies long ago discovered that electric equipment should be installed, maintained and operated under the direction of electrical specialists. No big company tries to function without such help. The Department of Mines of Pennsylvania has decided to test the value of such expert electrical men in mine inspection, and it is to be hoped that the state will continue their services indefinitely. These new officials should aid the operator greatly in improving his electrical practice and in safeguarding his mines. They should be, and doubtless will be, well received by the industry, for safety pays.

Pennsylvania some time back made a gesture in that direction. An electrical inspector was appointed, but it could hardly be expected that any one man could successfully function over so large an area. Great Britain long ago instituted an electrical inspectorate.

Many states need just such an addition to their inspectional forces as Walter H. Glasgow, the Secretary of Mines of Pennsylvania, has established. It does him great credit that he has seen this need and filled it. It will be strange, indeed, if now that it has been inaugurated in a more adequate manner than heretofore it does not become generally and permanently established. It should be extended to the anthracite region and to other states. As was stated at the Mine Inspectors' Institute of America when it met at Lexington, Ky., this year, the need in inspection as in operation is for greater specialization, with men who, while willing to look with approval on modern trends in mine operation, will yet safeguard them lest they get out of hand.

Reaffirms stand

DIRECTORS of the United States Chamber of Commerce at their meeting in Hot Springs, Ark., last month authorized the executive officers of the organization to oppose any features of the Watson coal bill (S. 4490) which would contravene the views heretofore expressed by the membership of the Chamber against unwarranted intrusion of government in the field of business. This reaffirmation of a position made public several years ago when the coal industry was the target of the legislative ambitions of Senator Calder comes at an opportune time. The sponsor of the Watson bill has announced his intention to press that measure at the next session of Congress. The United Mine Workers, which participated in the authorship, is making a brave show of demanding action.

That there is a determined and vociferous body of public opinion which favors a further extension of governmental control over industry is well known. That there are today many coal operators so wearied of the battle to remain solvent that they would welcome any nostrum which promised surcease from struggle and that membership in this group is growing is one of the disquieting situations which must be taken into account by those who hold that future prosperity may best be insured by continued encouragement of individual initiative and enterprise. There probably are even those who would swallow the Watson prescription as now compounded. For this reason, if no other, the sober and considered judgment of associated business must strengthen the forces of those fighting for industrial freedom.

But, as pointed out on another page, denunciation and exposition of the dangers of bureaucratic control are not enough. No industry under attack can expect to win permanent safety by pursuing a policy of negation. The time comes when destructive criticism of proposals for governmental interference must be supplemented and eventually supplanted by

constructive work within the industry itself. That hour seems to have struck in the coal industry. Operators and associations that are taking the lead in this constructive movement are justifying the faith of those who have stood with them in the necessary campaign of demolition.

Ruined records

DISASTER overtook the safety campaign of a large Pennsylvania steel and coal company a short time ago. An attempt was being made to exceed a previous plant record of 115 days without a lost-time accident. One hundred and seven days had passed and hopes were high when a mishap at the mine resulted in a lost time accident and blasted them.

The accident was not serious though the injured man was obliged to lay off, with a consequent stoppage in pay. The company also suffered a comparatively small loss, as not much equipment was destroyed, though the time spent by officials and safety men in investigating may add up to a respectable total. On the other hand, the setback with the goal in sight was felt keenly — and rightly too.

But aside from the ruined record, the officials and men of this company have reason to congratulate themselves on the thorough and painstaking campaign which they launched. While the goal was never reached the benefits derived from the formation of safe habits and safe thinking among employer and employee will be tremendous.

Not the way

A RECENT ISSUE of *The Illinois Miner,* official organ of district 12 of the United Mine Workers, reports the abandonment of loading machines in the Peoria district and states that there is "no conveyor now operating in fields north of Springfield." This declaration follows hard upon expressions in the same publication that the new scale sets a definite check upon the introduction of this machinery in the mines of Illinois; in fact, in some quarters that was advanced as an argument for ratification of the wage agreement negotiated between operators and miners in that state a few weeks ago.

Such utterances give substance to a revival of the charge that organized labor in the bituminous coal fields of the nation sets its face against inevitable progress. They put in issue the weight which interests friendly to the union may safely give to contrary pronouncements of John L. Lewis, international president of the organization, and other leaders who have tried to give the lie to those who have attacked the attitude of the mine workers on the question of mechanization. With the principle several times enunciated by Mr. Lewis and his associates that labor is entitled to a fair share of the fruits of progress through mechanization no fair-minded man can disagree. But a deliberate attempt to hamstring that progress does not square with professions of "a willingness to co-operate in the introduction of loading machinery."

History—political, economic and social—is replete with illustrations of the disasters which have overtaken those individuals, groups and organizations that have stood in the path of advancement. This is a machine age. Outside of those fields in which art is the essence of craftsmanship every substitution of mechanical energy for human drudgery is a step forward. No group, however strong, can long hope to oppose progress and survive. If the responsible heads of organized labor in the bituminous coal fields are as wise as we think they are, they will lose no time in repudiating by action as well as by word any belief that the union's support of mechanization is only a tissue-paper allegiance.

Are snowless streets a pipe dream?

IF J. C. DURHAM, County Commissioner of Reno, Nev., has his way this winter about sixteen miles of roadway on the high Sierras will be heated by steam in winter so that snow cannot accumulate and the course out of true love cannot be impeded. It seems strange that progress should be made in the heating of roadways so far from intensive civilization while the congested streets and sidewalks of the big cities continue to be hampered by heavy snowfalls.

Wherever the lines of steam-heat corporations traverse the streets and where the sidewalks serve as skylights to underground restaurants and stores the snow is melted and disappears frequently only to freeze elsewhere, proving how effectual is a little heat properly and continuously applied. Steam jets, flame throwers and cylinders of red-hot metal may serve little purpose in melting ice, but pipes below the surface should be effective.

It is doubtful whether pipes can be sunk in the actual pavement because they will expand under heat, natural or artificial, more than concrete. They probably will have to be placed under a pavement strong enough to arch over them . Under that condition the earth will store heat ready to melt any snow that may fall.

The improvement is bound to come before long. Railroad switches already are being kept in condition by steam heat. Everyone resents the delays which he is called on to sustain by reason of heavy snowfalls in places where there is much activity. The equipment will be expensive, its operation and maintenance costly, but so are the equipment, operation and maintenance of machines for the removal of snow, which after all are only tardy remedies whereas the steam pipe will remove the snow as fast as it falls.

NOTES

From Across the Sea

STRANGELY enough, it is from the Building Research Station, of Garston, Watford, England, that the mining public has just derived an interesting group of facts on the degree to which dried coal will expand when wetted. Apparently the inquiry was instituted to determine the effect of this expansion when concrete is made having coal as a part of the aggregate.

To a pure scientist the subject is intriguing. He desires to know whether coal is still a "gel," or gelatinous body. The station has discovered that coal expands on being wetted. Thus it is correctly designated as a "gel," using the word in its wider sense.

But what does it mean to the mining engineer? Much, perhaps, for the expansion of the coal may result in the weakening of pillars and in the closing of crevices that without such expansion would remain open, rendering the pillars pervious to water and penetrable by gas. The expansion of the coal when wetted, moreover, may be a principal cause of the bursting action which some coals develop when being mined. Its has been ascertained by the Garston station that young coals which are subject to oxidation are also quite susceptible to "imbibition," or the imbibing of water and to the swelling that results from such potations.

THE British, except at Bovey Tracey and a remote point in northern Scotland—Brora—have only well-developed coal. North America, on the other hand, has many Triassic and Cretaceous coal beds which are only slightly removed from peat, and the action of something on these is extremely rapid and destructive.

It is probable that with these coals results would be obtained far more impressive than those determined by the British Building Research Station on the coals which it tested, the effects on which are recorded by F. M. Lee in the October number of "Fuel in Science and Practice." That station's list of coals includes only those which would, in United States parlance, be described as of middle or high rank.

Briefly it is shown that the coals examined all "sorbed" moisture when in a saturated atmosphere, the quantity being greater or less according as the oxygen found in the coal increased or declined. The more oxygen, the more water imbibition till the oxygen reached 10 per cent. Thereabove the relation was uncertain.

For the experiments, coal cubes of ½ in. to 1 in. were cut from larger blocks. Two plane parallel faces were then ground on the ends of the pieces, first with a file and then with fine emery paper. The blocks were dried in a vacuum over sulphuric acid, and their expansion on being immersed in that liquid was measured by an extensometer.

THE coals that were disposed to take up much water and that had a high oxygen content expanded rapidly and their expansion soon reached a limit. The greatest expansion was found in measuring, at right angles to the bands, an almost wholly bright piece of coal from the Deep Hard seam of Nottinghamshire, England. It swelled 2.07 per cent in two hours and 2.08 per cent in one day.

It is found that the bright coal—which in the United States is termed "anthraxylon" and in Great Britain "clarain" or "vitrain," depending on the visibility of the structure under a microscope—expands in water more than the dull coal which is in the United States termed "attritus" and in Great Britain "durain."

The same coal parallel to the bedding expanded only 1.07 per cent in 2 hours and 1.10 per cent in a day. The dull coal from the same seam and locality expanded only 0.06 per cent in two hours; 0.40 in a day; 0.48 in two days and 0.51 in four days. Contrast this with a bright coal sample from the Parkgate seam in Yorkshire that had a proximate analysis showing only 1.5 per cent of moisture. It did not expand at all in 2 hours; after a day it had expanded 0.03 per cent; after two days, 0.057 per cent, and after five days, 0.086 per cent. However, it must be conceded that this specimen was not measured in the direction where the expansion is greatest but parallel with the bands.

In order that a coal seam may expand at right angles to the bands it must lift the roof. When a pillar expands vertically it must not only sustain the roof but bend it against its natural stiffness. A few minutes' consideration will reveal what wetting may mean to a coal physically dry. A swelling of 2.08 per cent such as the specimen of the Deep Hard seam developed vertically is equivalent in a seam 10 ft. thick to 2½ in. The pressures resulting from such expansions may bring bursting strains on the coal, which has not only to support but also to flex the rigid roof. Yet these destructive swelling tendencies in the coal are as nothing doubtless to those in the floor and roof. Witness the mines in the Gallup and Dawson districts of New Mexico.

The water in young coals which is chemically combined may become free moisture and thus cause the coal to swell. When 36 per cent of water is combined with the coal there is enough water in it to occupy when freed no less than 50 per cent of the volume occupied by the coal it has left. Of course the water never leaves the coal to that extent, certainly not at the face, but this exhibits the fact that enough moisture is freed to saturate and expand the coal. The study is one that might well receive some attention in the United States, where, as has been said, more striking evidences of expansion may well be expected than in Great Britain.

R Dawson Hall

On the ENGINEER'S BOOK SHELF

Modern Telpherage and Ropeways With a Section on Cableways and Cable Cranes; by Herbert Blyth; 154 pp., 7 x 9¾ in.; Van Nostrand Co., New York City; $7.

With thinner seams more rock and clay will have to be removed from the mines and among the available means for disposing of the waste is by a telpher or ropeway system. Many mines even today depend on some kind of ropeway for access to the railroad, down steep slopes, across hills, valleys and railroads and other obstructions. The book under Telphers describes rigid and flexible telphers, grabs, skip loaders, automatic control, track weighers, track switches, capital charges, maintenance and depreciation; and under modern ropeways, mono-cable and bi-cable systems, gradients, ropes, tension gear, terminals, angle stations, trestles, sheaves and load carriers.

* * *

The Mineral Industry During 1927; Vol. XXXVI; Edited by G. A. Rousch; 6x9 in.; McGraw-Hill Book Co.; $12.

The annual issue of "Mineral Industry," which reviews as promptly as is possible the activity of the metallic and non-metallic mines in the United States and abroad, is just off the press. In the hands of R. W. Morris, for many years an editor of *Coal Age* in charge of market matters, coal receives its due proportion of attention and is more than ever representative of the standing of the industry in all its phases. The other departments are covered with equal fullness.

Among the Manufacturers

JOHN A. MANLEY, who has, for the past three years, been manager of sales development for Fairbanks, Morse & Co., Chicago, has been elected vice-president in charge of sales.

* * *

H. E. CHILCOAT has joined the organization of the Koppel Industrial Car & Equipment Co. as manager of sales, air dump car division, with headquarters at Pittsburgh, Pa.

* * *

CONSOLIDATION of Symons Brothers Co., Chicago, with the Nordberg Mfg. Co., Milwaukee, Wis., has been announced. For some time a large proportion of Symons crushers have been produced in the Nordberg plant. A continuance of past policies is assured.

* * *

THE ROLLER-SMITH Co., New York City, announces the appointment of Arthur H. Abbott, Inc., 88 Broad Street, Boston, Mass., as its district sales agent for New England territory.

* * *

WALTER G. HILDORF has been placed in charge of all metallurgical work for the Timken Steel & Tube Co., Canton, Ohio.

* * *

THE ATLAS CONVEYOR Co., INC., 20 South 15th St., Philadelphia, Pa., announces that A. J. Forschner, who joined the company in July as vice-president, has also taken over the duties of secretary for the company. He succeeds E. A. Thumlert in the latter office.

* * *

SPENCER S. SWASEY, of Chicago, has joined the Walter A. Zelnicker Supply Co., of St. Louis, as manager of the equipment department.

* * *

HAROLD C. OSMAN, secretary of the Nugent Steel Castings Co., Chicago, and heretofore in charge of sales, has been appointed works manager.

* * *

KENNEDY-VAN SAUN Co. OF ILLINOIS has been formed, with offices in the State Bank Building, 120 South LaSalle St., Chicago. T. J. Shearer is manager in charge.

* * *

MOORHEAD - REITMEYER Co., INC., Pittsburgh, Pa., announces the appointment of Wallace E. Kirk as manager of the storage-battery and locomotive department.

THE LINCOLN ELECTRIC Co., Cleveland, Ohio, announces the opening of a San Francisco office at 533 Market Street in charge of W. S. Stewart. L. P. Henderson, formerly of the Chicago office, has been transferred and put in charge of the Minneapolis district. Robert Notvest has been transferred from Kansas City to take charge of the Indianapolis district. R. E. Mason has been sent to Kansas City to replace Mr. Notvest. N. L. Nye has been stationed at Akron, Ohio, under the direction of R. P. Tarbell, manager of the Cleveland district.

* * *

N. L. MORTENSEN has been appointed chief engineer for the Cutler-Hammer Mfg. Co., Milwaukee, Wis. T. E. Barnum, former chief engineer, has been made consulting engineer.

* * *

FRANK B. PARKER, general manager of Briggs & Turivas, Inc., Blue Island, Ill., has been made vice-president and general manager.

* * *

PLANS have been completed for doubling the capacity of the Richmond Car Works, a subsidiary of the Standard Steel Car Co., at a cost of $500,000.

* * *

THE BASSIC MFG. Co., 2650 No. Crawford Ave., Chicago, has changed its name to the Alemite Manufacturing Corporation.

* * *

THE IDEAL COMMUTATOR DRESSER Co., Sycamore, Ill., has appointed as its representative in New England territory Albert E. Mace Co., Inc., 93-97 Heath St., Boston, Mass.

* * *

JOSEPH T. RYERSON & SON, INC., of Boston, New York and Chicago, have acquired the plant, merchandise and good will of the E. P. Sanderson Co., at Third, Binney and Munroe Streets, Kendall Square, Cambridge, Mass.

* * *

WAGNER ELECTRIC CORPORATION, St. Louis, Mo., announces the addition of R. W. Piper to its transformer sales division. He will cover the southeast district, including a section of West Virginia and the states of Virginia, North Carolina, South Carolina, Alabama and Florida. H. D. Epting has been transferred from the Philadelphia sales office to the Atlanta sales office.

THESE NEW LINDE PLANTS recently started production of oxygen: 631 South 17th St., Harrisburg, Pa., in charge of J. J. Naber; 17th and West Lawrence Sts., Allentown, Pa., in charge of W. Barber; Foster and Thomas Sts., Shreveport, La., in charge of F. T. Rueger; First Ave. and B St., South Charleston, W. Va., with Ed Pohlman as superintendent; 125 Settlement St., Akron, Ohio, under direction of A. Deagon, superintendent.

* * *

THE PENN MACHINE Co., Johnstown, Pa., has opened a new branch office and warehouse at 201 Eleventh St., Huntington, W. Va. A. F. Marshall, district sales manager, is in charge.

* * *

INTERNATIONAL COMBUSTION ENGINEERING CORPORATION has completed negotiations for the purchase of the Hedges - Walsh - Weidner Co., Chattanooga, Tenn., a recent combination of the Casey-Hedges Co. and the Walsh & Weidner Boiler Co., well-known boiler manufacturing companies.

* * *

THE FALK CORPORATON, Milwaukee, Wis., announces the appointment of B. W. Rogers, 225 Central Savings & Trust Building, Akron, Ohio, as representative for Akron and environs.

* * *

THE AIR REDUCTION Co., INC., New York City, has purchased the business and property of the Ohio Oxygen Co., Niles, Ohio.

* * *

RICHARD H. DANA, formerly vice-president and treasurer of Hodge & Dana, Inc., New York City, active in the vibrating screen field, is now connected with the Robins Conveying Belt Co. and will specialize in the engineering and sale of screens.

* * *

BOTFIELD REFRACTORIES Co., Philadelphia, Pa., announces the appointment of W. E. Tierney as representative in the South and Southwest with headquarters in New Orleans.

* * *

CHICAGO PNEUMATIC TOOL Co. announces the appointment of H. H. Sherman as manager of the publicity department with headquarters at the general offices of the company in New York City. Mr. Sherman joined the company in 1927 as assistant publicity manager.

The BOSSES *Talk it Over*

Why Is a Good Foreman?

"Well," said Shorty, "it looks like a full house today. I see the Old Man coming. Wonder who that is with him."

"Oh, that's the sales manager," said Jim. "I see him around every now and then."

The Old Man came in and introduced the stranger to Mac and Shorty. "I hear," he said, when the pipes were going, "that our neighbor, Laurel Run, is getting a new mine foreman."

"I guess the other one was too easy-going from all reports," Jim replied. "He let his men get away with murder, and safety and efficiency sure went to the dogs rapidly."

"Yeh," the Old Man replied; "I'd heard they weren't getting the tonnage they should. This new man comes from over in the next county and they say he won't take any foolishness."

"My buddy that works over there says he knows him," Shorty, the electrician, broke in, "and he's looking for him to give him a little co-operation and get that mess of junk they have for machinery fixed up. It's no wonder they can't get any coal with all the patched-up stuff they have to get it with."

"There is another thing you fellows are going to have to worry about now," quoth the sales manager. "They got this man because they're sure he'll insist on the loaders cleaning the coal. And I've got a quiet tip they're also going to put new machinery in their tipple. You boys are going to have a little competition before long."

"And that," said the Old Man, "brings up the subject of what we are doing along the same line. I know you boys have been doing good work lately, and all I want to say is not to slack off. Now, Mac, since you are naturally the most familiar with the actual mine conditions, what do you think of the present state of our equipment and inside preparation? Do you think we are doing all that is possible?"

—What do you think the qualifications of a good foreman are?

—What would you recommend that a foreman do to improve himself to better discharge his job?

—Can the foreman's attitude toward production affect sales?

—What should the foreman do to displace old equipment with the right kind of machinery for the job and to properly maintain it?

All foremen, superintendents, electrical and mechanical men are urged to discuss these questions. Acceptable letters will be paid for

Perplexing Problems Seen From Many Sides

Age-Old Good-Will Problem Calls for Delicate Handling

THE problem of keeping the labor forces continuously satisfied at their various forms of activity in any operation is an age-old one, and always will create uncertainty in its solution because here enters the many-sided human factor, easily swayed at a fancied wrong and sometimes too prone to listen to some glittering account of the many benefits to be obtained by transferring allegiance to a neighboring operation. Too often the bubble soon bursts, but the harm has already been done to the former employer in the case of a good workman as well as to himself. The workman has temporarily deranged an organization which was functioning as a co-operative unit and at the same time has unwittingly lowered his own self-esteem, because the good workman of today differs from that of yesteryear in that, through the many advantages of improved community welfare, gained doubtless through the willing co-operation and, in some cases, sacrifice of a conscientious employer, he has developed to the stage wherein he can more readily differentiate between right and wrong.

Jim strikes a fair attitude on this perplexing situation, but possibly the many improvements effected have not been introduced along educational lines. Unfortunately only a small percentage of the human race make good organizers, and apparently the key to this situation lays in organization of an educative kind.

The Old Man is absolutely correct in his attitude toward a foremen's course. This course should take the form of salesmanship; the foremen should be taught to interpret in a proper manner the many benefits to be derived from labor-saving machinery, safety measures and lower production cost ideas to the workmen. Incidentally, they should be taught the proper method of discussing with the latter their working troubles, assuring a kindly interest and possible solution, ask of their opinion frankly, and if the foreman can go one better toward a solution, offer it as a measure of greater benefit as if the idea had cropped up through discussion (which usually occurs). In other words, every workman in the plant should be developed into a working suggestion box and immediate steps taken to right every apparent wrong. If this is done there will soon be a reduction in the labor turnover.

No management methods should be modernized until the whole subject has been discussed with every foreman on the job. Nothing can undermine the efficiency of under officials quicker than for the chief executives to fail to take the latter into their confidence prior to a prospective improvement in managerial methods. Apart from personal feeling, there will develop a feeling of insecurity, which will eventually impair initiative. This is where an efficiency engineer should prove a real boon—one who is big enough to listen to another's point of view, who is broadminded and has the organizing and educative ability to co-ordinate and weld together officials and workmen alike into one co-operative unit; who is big enough to brush aside petty prejudice, apart from the management, but nevertheless the key man of the whole organization. Such men may be scarce but they can be obtained, but not on the basis of a cheese-paring salary. Such a man would be the one to handle the foremen's training course; given a free hand, he should prove a powerful asset. JOHN BENNETT.

Cassidy, B. C., Canada.

The Best Way

Doing jobs "after a fashion"—just to get them done—may "get by" for a time, but it won't result in a well-managed mine. It is the resourceful boss, who uses his head, that does things the best way.

What are your ideas on the questions asked on the opposite page? Letters accepted and published are paid for.

Slackness in Making Repairs Is Unsafe and Inefficient

THE mine manager should receive daily reports from the electricians, giving in detail the jobs completed and their recommendations in regard to future work and necessary overtime required for safe and efficient operation of machinery. In addition, a daily consultation between mine manager and electrician may be depended on to smooth the electrician's path and make his efforts count where most needed.

The best means of regulating the quantity of repair supplies is to keep the machinery in good repair. Efficient and responsible workmen and an adequate repair supply are of first importance in this campaign. A definite understanding between the superintendent, mine manager, mine electricians and the warehouse and central machine shop force will certainly cut down the time a machine is out of service. Cut the red tape and, by all means, avoid delay in applying the necessary repair parts. If Shorty is fortunate in having a few extra parts it is evidence that the equipment is being taken care of.

Safety is dependent, in a number of instances, on the speedy repair of a machine or electrical installation, and laxity in this regard has led to disasters in the past. The official charged with ordering supplies may reduce the time a machine is out of service and cutting down production or creating unsafe conditions, by prompt transmission of supply orders. THOMAS ENGLISH.

Springfield, Ill.

Daily Records Help Repair Force Function Efficiently

DAILY reports in the hands of an electrical foreman will enable him to make a circuit of the mine and lend aid and direction where it is most needed, thus reducing the time lost by equipment. He may then oversee the handling of serious breakdowns, leaving the others to the regular force, supervise the ordering of the necessary parts or send the machine to the shop if necessary.

Systematic organization of the repair department also may be relied upon to cut down the stock of parts and reduce the time loss. A definite understanding between the mine and the warehouse and machine shop will increase the efficiency of the repair force and reduce the stock of parts.

A plan which might be followed with success requires that the electrical foreman or mechanic visit the breakdown. He may then decide whether it can be handled by the repair gang, and what parts are necessary to put the machine in operating condition. He then would oversee the ordering and installation of the parts.

The warehouse is the proper place to keep supplies and only those continually required should be kept at the mine. Only a minimum number should be kept and these replaced immediately upon use. W. E. WARNER.

Brentford, England.

Standardization and Wise Buying Will Reduce Costs

THE first step in reducing the quantity of electrical repairs stocked is in an intelligent, standardized installation of electrical machinery. Most up-to-date companies prospect their acreage, study the coal seam and its characteristics and decide on the daily tonnage to be produced. With these facts in hand it should be easy to standardize on the equipment to be used. Once having standardized, any deviation from rule will result in a number of different makes, types or weights of machinery. And then the managing officials are likely to wonder what the multiplicity of parts stocked and the heavy weather suffered by the repair department resulted from.

Apart from this, an intelligent purchasing agent will more than earn his salary by keeping the stock at the lowest point consistent with economy and efficiency and by purchasing at the low-

est prices. An intelligent study of the quantity of supplies used per month or year will yield facts on which quantity buying may be based. The mine foreman can, with his knowledge of the acreage being worked, furnish the purchasing agent with estimates of material required (track, bonds, ties, etc.) of which the purchasing agent has no record of use. Then, if the purchasing agent is in touch with the trend of prices, he may be able to purchase in quantity in times of low price, or string his buying out when costs are high.

The Knox Consolidated Coal Co. has five large mines situated within 10 miles of each other. The needs of the mines are figured within 30 days and, on account of standardization, the quantity can be closely regulated. If one mine should run short, parts may be quickly trucked in from another. All armature winding is done at American No. 1 mine, the armatures being transported to and from there by truck. Here the rewinding, dipping, baking, testing and other necessary operations are in charge of the chief electrical and mechanical engineer. Ease of movement between mines is of no little aid in reducing the quantity of parts kept on hand.

THOMAS JAMES,
Supt. Knox Consolidated Coal Co.
Vincennes, Ind.

Efficient Distribution and Reports Key to Success

I AM of the opinion that the general mine foreman in direct charge of mine electricians would be of considerable help to them by receiving daily reports (whether oral or written) because only the foreman knows just what underground job is most essential for such men to perform in order that his daily tonnage program will not be interfered with.

On account of the depressed market condition that has confronted the coal industry, I believe that stocking of repair parts should be limited to those for the machinery actually engaged in the production of coal. An efficient distribution system should be established and when one repair part is placed in service another should be immediately ordered. This system should hold the supply cost to a minimum where the executive in charge has the full co-operation of the workmen under his supervision.

The writer's experience has been that the electrical department, supply department and the machine shop should function as one unit in so far as possible in order to curtail the time a machine would be out of service. Co-ordination of these departments will be the means of eliminating much wasted time.

A central supply house and machine shop will prove a money saver where a coal company is operating a number of mines in a district adjacent thereto, because by aggregating the equipment and workmen, better efficiency can be obtained. Also mine materials and equipment can be distributed in a more efficient manner from a central distributing point than is possible from supply houses located at each individual operation.

C. T. GRIMM.
Adrian, W. Va.

Training in First Aid Called Inseparable Ally of Safety

IN VIEW of the first-aid contests, safety rallies and similar activities which mark this season, I will try to show that "the first aider is essentially a safety man." I believe that first aid is of inestimable value in preventing accidents.

It will materially assist us to visualize this relationship if we define safety first as first aid to the uninjured and first aid as safety first to the injured. The construction of the definitions immediately suggests that both of these forces are closely allied in accident prevention. It is impossible to be effective in the one without giving heed to the other. It may be impossible to expect 100 per cent safety first, but to proceed with that goal in mind is much the better policy. The adoption of first-aid training will greatly assist in reaching it.

Safety first and first aid cannot function independently. To centralize efforts on the cause of accidents is insufficient, as they can never be entirely eradicated as long as the human mind is prone to

Trade Literature

Mining Applications of the Cosco Shaker Conveyor, Conveyor Sales Co., New York City. Pp. 16; illustrated. Shows various methods of developing mines for use with conveyors. It has the advantage of giving plans shorn of their many incidental variations that weary and perplex the reader. The author gives thirteen plans with the aid of which operations by conveyors may be successfully laid out.

Portable Electric Hoists. Sullivan Machinery Co., Chicago, Ill. Bulletin 76-J. Covers hoists from 10 to 35 hp., in both single- and double-drum patterns.

Coal and Rock Drills for Use in and Around Mines. Leetonia Tool Co., Leetonia, Ohio. Catalog No. 829. Breast augers, copper-tipped and steel tamping tools, picks, wedges and cutter bits are some of the articles covered besides coal and rock drills.

Gear-Drive Gasoline Locomotives. Mid-West Locomotive Works, Hamilton, Ohio.

Standard Buildings of Copper Bearing Galvanized Steel. Blaw-Knox Co., Pittsburgh, Pa. Bulletin 1057.

Hercules Powder Co., Wilmington, Del., has issued Blasting Supplies, 29 pp., and High Explosives and Blasting Powders. 31 pp. The latter gives a concise description of all Hercules standard commercial explosives, with their characteristics and principal uses.

Bulletin 2114 of the Crouse-Hinds Co., Syracuse, N. Y., illustrates and describes the new Obround Condulet and the Wedge-Nut.

Plat-O Vibrating Screen. Deister Machine Co., Fort Wayne, Ind. Describes construction, vibrating mechanism, tension bolts and coil supporting springs. The Cone Baffle Classifier also is described and illustrated.

A Technical Discussion on Zinc Meta Arsenite is the title of a booklet issued by the Curtin-Howe Corporation, New York City. Part I is entitled "Chemical Reaction of Wood Destroying Fungi"; Part II, "Chemistry and Toxicity Data," and Part III, "Weathering and Field Tests."

Bucket Elevator Catalog No. 465, issued by the Jeffrey Mfg. Co., Columbus, Ohio, includes information and illustrations of different styles or types. The Silent Ratchet Safety Lock, supplied with any bucket elevator, also is described.

Reliance Electric & Engineering Co., Cleveland, Ohio, has issued Bulletin No. 103, illustrating and describing Type AA Fully Inclosed Fan-Cooled Induction Motors, with ball bearings, for two and three-phase alternating current circuits.

Students' Kelvin Bridge, Bulletin 434, was recently issued by the Leeds & Northrup Co., Philadelphia, Pa.

Single-Phase Motors. Wagner-Electric Corporation, St. Louis, Mo. Bulletin 157.

Ohio Brass Co., Mansfield, Ohio, has issued a 16-pp. booklet, describing and illustrating its new 250- and 600-volt lightweight portable electric arc welding machines for use in mine track circuit bonding and general repair work.

Lincoln Electric Co., Cleveland, Ohio, has issued a 32-pp. book, How to Begin the Application of Arc Welding in Production Manufacturing. This is a supplement to the 160-pp. textbook Arc Welding—The New Age in Iron and Steel.

The following bulletins have been issued by the Mine Safety Appliances Co., Pittsburgh, Pa.: No. 12, illustrating and describing the New Edison Model F Miners' Electric Safety Cap Lamp. No. 30, Torridaire Hot Pads, illustrating the use of these pads in keeping the patient warm. No. 50, illustrating and describing the Improved Burrell Gas Indicator.

Pennsylvania Crusher Co., Philadelphia, Pa., has issued Bulletins 2003 and 2004, the former illustrating and describing its Steelbuilt Penn-Lehigh Crushers, and the latter its Steelbuilt Pennsteel Crushers.

Palmer-Bee Co., Detroit, Mich., has issued a four-page folder illustrating and describing the features and advantages of its new line of herringbone speed reducers.

Farrel-Sykes Roller Bearing Type Speed Reducers. Farrel-Birmingham Co., Inc., Buffalo, N. Y. These speed reducers are rated from 1 hp. to 5,000 hp.

"Sulamite" for Setting Diamond Core Drill Bits is the title of a leaflet issued by the Sullivan Machinery Co., Chicago, Ill. Bulletin 80-H. Describes the service of this substance, which has been used for two or three years past in Sullivan diamond core drills.

Jeffrey Mfg. Co., Columbus, Ohio, has issued Catalog No. 450, comprising 32 pp. on its Swing Hammer Pulverizers. Two special adaptations of these pulverizers described in the catalog are the Coal Sampler and Limepulver.

The following bulletins recently were issued by the General Electric Co., Schenectady, N. Y.: Automatic Welding Head and Control, GEA-556A; automatic electrode-feeding device—magnetic clutch type. CR7009-B12, GEA-844, across-the-line type of magnetic reversing switch for single-phase, two-phase and three-phase motors. Type WD-200A Arc Welder, GEA-874B; belt, motor or gas-engine drive, stationary or portable, self-excited, variable voltage, single operator. General Electric Arc Welder, Gas-Engine Driven, GEA-1009; welding current independent of local power limitations. Direct-current Crane and Hoist Motors Type CO-0820, GEA-38A. G-E Type AW Resistor Arc Welders, GEA-1031.

err. Therefore, it is most essential as long as people are likely to be injured that safety first before accidents be supplemented by proper care and treatment after injuries are sustained. The first-aid organization is specialized in this phase, and can give proper attention when prevention has failed to achieve its object.

Sometimes we are tempted to say that certain accidents are necessary, for the expression "Well, it will be a lesson to him," often is heard. But such a philosophy is callous and has no part in a safety-first movement. The simple scratch on the hand might, from the standpoint of safety, be allowed to remain untreated with resulting infection and loss of the member. At this point first aid is of greatest service, and while it is not a substitute for accident prevention it promotes thought on safety practices. Workers well trained in methods of treating minor and even major injuries are daily demonstrating the value of their knowledge of first aid.

In conclusion, I say again that the relationship of first aid to safety first is inseparably joined. They are equal in the scheme of human welfare, and one without the other will not produce the fullest and best of results.

W. W. HUNTER.

Mount Hope, W. Va.

Publications Received

Mineral Resources of the United States in 1927 (preliminary summary). Introduction by Frank J. Katz; statistics assembled by Martha B. Clark. Bureau of Mines, Washington, D. C. Price, 20c. Pp. 120.

Quantity of Wood Treated and Preservatives Used in the United States in 1927, by R. K. Helphenstine, Jr. Forest Service, U. S. Department of Agriculture, in co-operation with the American Wood Preservers' Association.

Geology and Mineral Resources of the Herscher Quadrangle, by L. F. Athy. Illinois State Geological Survey, Urbana, Ill. Pp. 120; illustrated. Price, 50c. Describes the surficial deposits and underlying rock formations, interprets their origin and history, delineates the geologic structure and discusses the mineral resources of the area.

Fuel Briquets in 1927, by F. G. Tryon and J. M. Corse (Mineral Resources of the United States, 1927, Part II). Bureau of Mines, Washington, D. C. Price, 5c. This report gives official detailed statistics, based upon reports from manufacturers, of the briquet industry in 1927. A summary of the world's production for 1927 also is included.

How Powdered Coal Stands Today, by Henry Kreisinger, is the title of a reprint published by the Combustion Engineering Corporation, New York City. Methods of firing, furnace design and rates of combustion are discussed.

Year Book on Coal Mine Mechanization, 1928, by G. B. Southward. American Mining Congress, Washington, D. C. Price, $3. Pp. 273; illustrated.

The Hand-Writing on the Wall—A Chemist's Interpretation, by Arthur D. Little. Little, Brown & Co., Boston, Mass. Price, $2.50 net. Pp. 287. Following are the titles of the different chapters: The Contribution of Science to Manufacturing, Chemistry as an Investment, The Trend of Development, The Romance of Carbon, Fuel Today, Fuel Tomorrow, the Chemical Industry, the Sinews of War, Misapplied Chemistry, Making the Most of America, the Fifth Estate.

Anthracite Culm and Silt, by James D. Sisler, Thomas Fraser and Dever C. Ashmead. Topographic and Geologic Survey, Department of Internal Affairs, Harrisburg, Pa. Bulletin M12. Price, 50c. Tells where the silt and culm deposits are found, how much of the material is available, what its quality is and how it can be used; stream pollution and channel silting also are covered.

Prevention of Misfires, by A. E. Anderson. Explosives Service Bulletin of E. I. duPont de Nemours & Co., Inc., Wilmington, Del.

Blasting Coal Underlying a Tender Roof or Overlying or Underlying a Middle Binder, by George S. Brown. Explosives Service Bulletin, E. I. duPont de Nemours & Co., Inc., Wilmington, Del.

Bituminous Coal Fields of Pennsylvania. Introductory Volume, Part I. General Information on Coal, by George H. Ashley. Topographic and Geologic Survey, Department of Forests and Waters, Harrisburg, Pa. Bulletin M6. Price, 50c. Includes general information on coal, its character, origin, classification, with brief descriptions of bituminous coal beds and coal fields.

Finding and Stopping Waste in Modern Boiler Rooms. Cochrane Corporation, Philadelphia, Pa. Publication No. 1600. Price, $3. Third edition.

The Classification of Coal, by Samuel W. Parr. Engineering Experiment Station, University of Illinois, Urbana, Ill. Bulletin No. 180. Price, 35c. Includes a historical sketch of coal classification, fundamental factors and the Parr system of coal classification.

Report on Pendleton County, by John L. Tilton, William F. Prouty and Paul H. Price. West Virginia Geological Survey, Morgantown, W. Va.

Geology and Lignite Resources of the Marmarth Field, Southwestern North Dakota, by C. J. Hares. U. S. Geological Survey, Washington, D. C. Bulletin 775.

1928 Supplement to Book of A.S.T.M. Standards. American Society for Testing Materials, Philadelphia, Pa. Price, $1.50.

A Laboratory Furnace for Testing Resistance of Firebrick to Slag Erosion, by Ralph K. Hursh and Chester E. Grigsby. Engineering Experiment Station. University of Illinois, Urbana, Ill. Circular No. 17. Price, 15c.

Spontaneous Electrification in Dust Clouds (with special reference to coal-dust clouds), by S. C. Blacktin. Safety in Mines Research Board, Paper No. 43. Price, 6d. net. Pp. 19; illustrated. H. M. Stationery Office, Adastral House, Kingsway W. C. 2, London, England.

Firedamp Explosions—The Projection of Flame, by M. J. Burgess. Part II. Safety in Mines Research Board. Paper No. 42. Price, 6d. net. H. M. Stationery Office, Adastral House, Kingsway, London W.C. 2, England. Covers the projection of the flame of an explosion beyond the original confines of the explosive mixture.

Sixth Annual Report of the Safety in Mines Research Board, 1927. Price, 9d. net. The subjects of research included relate to coal-dust explosions, firedamp explosions, spontaneous combustion of coal (including treatment of gob fires), safe use of electricity in coal mines, mining explosives, safety lamps, etc. Pp. 55; 6x9 in. H. M. Stationery Office, Adastral House, Kingsway, London W.C. 2, England.

Increased Tonnage Per Man Will Pay for Better System

THE LOGICAL SOLUTION for the tonnage-per-loader problem encountered by Jim and Mac is to supply more cars at the face per trip. The single-track one-car system can be so changed as to supply the miner with two or more cars per trip, at negligible cost—provided, of course, that natural conditions warrant. One alternative is the step system, described in *Coal Age* in 1926; another is a switch in the last breakthrough.

My preference is for the angle-face system. When the room is as wide as the project calls for the angle should be started by cutting in the right, tailing out the cut about 6 ft. from the right rib, this process being repeated until the face is on an angle of 45 deg. to the rib. The track in the room should be about 3 ft. from the short rib with the sight line in the center of the track. If for a two-car trip the track across the face can be made into one piece. The jumpers should be at the angle and a row of timbers should parallel the face track.

When the track is moved up the temporary timbers also should be moved up and replaced with permanent timbers. The place should be cut so that the man or men can clean it up in the average number of days; for instance, if the place takes two cars the average number of cars per man per day is ten, but every third day he will have only two cars to load out. The place should then be cut to make twenty cars.

If the place is cut with a shortwall machine unbolt the jumpers and tip the face track on edge; it will then be out of the way. If cut by an arcwall, the track has to be moved up to the face. Close attention must be given in using this system, keeping the track in alignment, etc., but the increased tonnage per man will well repay the management.

W. E. STRAUGHAN.

Oteen, N. C.

British Letter Advocates Mine Dispatching System

BY ALL MEANS the transportation system of a mine should be under the direction and control of a dispatcher, who should be a man with practical experience in running mine locomotives and thoroughly conversant with all the routes through the mine. With full charge of motormen, day-to-day knowledge of the cars available, progress of operations and number of men in each section, he will be in a position to place cars to the best advantage to speed output and maintain satisfaction among the loaders.

Installation of permanent phones at junctions and loading points and of portable instruments for the use of loaders is necessary to avert delays in transportation under ordinary conditions, but in emergencies such as when accidents occur or a breakdown in equipment they are indispensable.

BRITISHER.

OPERATING IDEAS *from* Production, Electrical *and* Mechanical Men

Changes Equipment to 250 Volts By Connection Shift

CERTAIN coal mining companies having 500-volt equipment are reluctant to change to 250-volt on account of the enormous expense involved. The Union Pacific Coal Co. at Rock Springs, Wyo., has succeeded in making the change to 250 volts, and it is thought that some of the methods of reconnecting the d.c. generators will be of interest to readers of *Coal Age*, writes D. C. McKeehan, chief electrician.

One generator of 100-kw. capacity, four poles, with wave-wound armature containing 204 coils and 203 commutator bars was changed to a lap winding. One bar was added to the commutator in order to make use of the dead coil left idle in the wave winding. Equalizers were connected to the commutator risers at bars 1-103 and 52-154. The shunt-field coils were connected in parallel so as to have the two positive poles in one circuit and two negative poles in the other circuit. This was

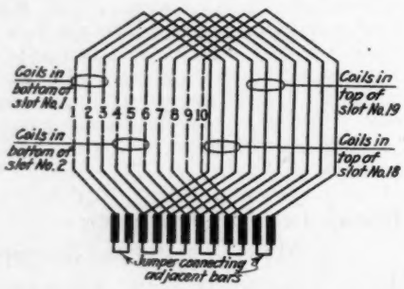


Fig. 1—Tops and Bottoms of Coils 3 and 4 Are Interchanged

necessary in order to eliminate shaft stresses in case one of the circuits should "open" with the machine running.

The series and interpole coils were connected in two parallel groups with two coils in series in each group in order to carry double the former amperage.

For the method of reconnecting armature coils of three 150-kw. generators reference is made to the accompanying sketches. The original 500-volt winding was lap wound and armature coils were connected to commutator bars 1 and 2. In changing to 250 volts the top leads at the commutator were moved over one bar, making the coil connection to bars 1 and 3. This formed a sandwich winding, one circuit connecting all even numbered bars and one connecting all odd-numbered bars. Brushes of twice the original thickness covering six bars were used to parallel the two windings. Starting at the left side of Fig. 1, coils 1 and 2 in slot 1 are jumpered together at the commutator. The bottom of coil 3 in slot 1 was connected to the top of coil 4 in slot 19 and bottom coil in slot 2 was connected to the top of coil 3 in slot 18.

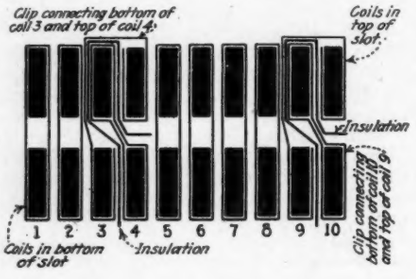
Coils lying in the same slot may be connected in parallel without difficulty but when they lie in adjacent slots it is necessary to cross-connect them in order to equalize the counter emf. at time of commutation. This was accomplished by cross-connecting coils numbered 3 and 4.

Two coils are cross-connected, then four coils are skipped and the next pair are cross-connected, and so on around the armature. The start was made so that the equalizer connections were on one of the coils in the groups of four and were not disturbed.

Fig. 2 shows the back end of an armature having a bar winding. The bottom of coil 3 is connected to the top of coil 4 and the top of coil 3 is connected to the bottom of coil 4 with special types of clips. A strip of insulation is laid in to hold the bars apart and the end band securely holds the coils against movement.

The shunt, series and interpole coils were connected in parallel as previously described for the 100-kw. generator.

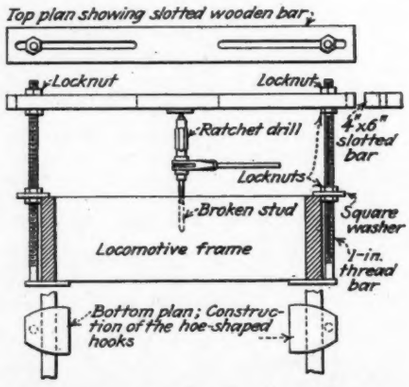
Fig. 2—Interchange at Back End of Bar Winding



Studs Easily Removed With Drill Support

Drilling broken studs out of locomotive and motor frames usually is attended with the difficulty of properly fastening or supporting the drill in a working position, according to Charles W. Watkins, Kingston, Pa. Therefore he submits an apparatus designed to furnish such support and which may be quickly applied.

It consists of two thread bars each having a hoe-shaped hook on one end, as shown in the sketch, a slotted wooden bar and the necessary locknuts and washers. The hoe-shaped hooks en-



Construction Details: Drill Support for Drilling Out Broken Studs in Locomotive or Motor Frames

gage the lower edge of the locomotive frame and the square washers are clamped to the upper edge by means of the locknuts. The slotted wooden bar is then slipped over the thread bars and held by locknuts. The drill may then be fixed in position and the stud drilled out.

In constructing the apparatus the threads on the thread bar should be so cut that the nuts will run easily from end to end. The long slots in the wooden bar allow it to be used on frames of various widths. In case the drill must be used at an angle, another

beveled wood bar with slots may be constructed. The apparatus also may be applied to drill up from the bottom, as well as down from the top.

Arcweld Straightens Locomotive Axles

If electric welding improperly applied will bend a locomotive axle, why cannot the same effect be utilized to straighten a crooked axle? Because one of the shop men asked the foreman that question it is now the practice at the central shop of the New River Co., Macdonald, W. Va., to straighten locomotive axles by electric welding.

When building up worn axles the welders found that cautions regarding necessity for even heat distribution were not exaggerated. If the beads of metal were not applied alternately to diametrically opposite sides of the axle the job resulted in a bend. More welding on one side than on the other caused the former to become concave. In other words welding caused a shrinkage on the side where applied.

The straightening is done while the axle is in the lathe where it is placed for checking the extent and location of the bend. A bead row, or two, applied parallel to the length of the axle is welded onto the concave or high side. After a wait of a few minutes for cooling, the axle is checked again for trueness. If more straightening is required another row is added, and so on. The welded streak is then turned off flush with the curved surface.

It is best to use an amperage approximately 40 per cent higher than that for ordinary welding. If the axle is one that is 3½ to 4 in. in diameter and it is out of true as much as ¼ in., it is advisable to use a ¼-in. electrode and about 350 amperes of current.

In the accompanying photograph an arrow points to an arcweld fill on a worn axle, and the bracket indicates a bright or shiny streak on another axle where two or three rows of straightening beads were machined off. In this instance the wheel was removed for a gear renewal rather than because of the bent axle. In most cases the straightening is done without removal of wheels or the gear.

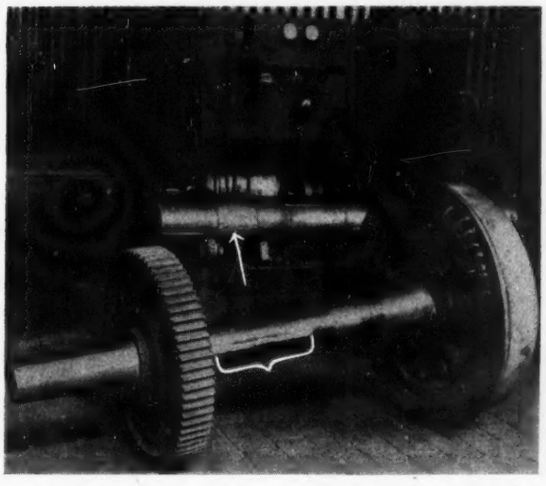
Just how the straightening takes place is not easily understood by those who are not specialists in metallurgy. Apparently the welded section shrinks, but it might appear that the axle is not given a permanent set and that because of the lower tensile strength of the welded metal its comparatively small section would crack in places and allow the axle to spring back to the bent position.

That this does not happen, however, is indicated by the fact that some of the straightened axles have been in service for as long as three years and no trouble has been detected. An inspection of reconditioned trucks in the wheel yard usually reveals three or four axles that have been straightened by the arc process and are ready to return to the mines. As compared to the old method of removing the wheels and gear and straightening the axles by heating in a fire the new method represents a material saving.

How Many Ideas?

How many $5 ideas have you under your hat? Operating men who have worked out mining kinks, electrical men and mechanical men who have short cuts find their way into these pages.

Photographs and sketches help to make your ideas clear. What have you?



Truck with Straightened Axle Rolled Into Welding Booth for Photographing

Plenty of "Stop" Buttons Favored in Utah

In the Utah coal fields the preparation of coal is receiving more attention at present than any other phase of the business and, as a result, most of the mines in this district are either building new tipples or remodeling the old ones in order to get better preparation, according to F. A. Rank, General Electric Co., Salt Lake City, Utah.

Practically all of the new tipples are being equipped with remote-controlled motors with all of the starting push-button stations located at one place and operated by one man. "Stop" buttons, however, are located at a number of points—anywhere between ten and twenty—around the tipple. As a result, the tipple can be shut down from several places, but can be started from one point only. Inasmuch as the tipple motors are but a comparatively small portion of the total mine load, and as a small flicker in voltage is not objectionable, these motors generally are started directly across the line, standard magnetic starting switches being used.

The Utah coal is comparatively soft; in some cases several inches of dust will settle on a switch after a few days' operation. The devices used, however, are working without trouble.

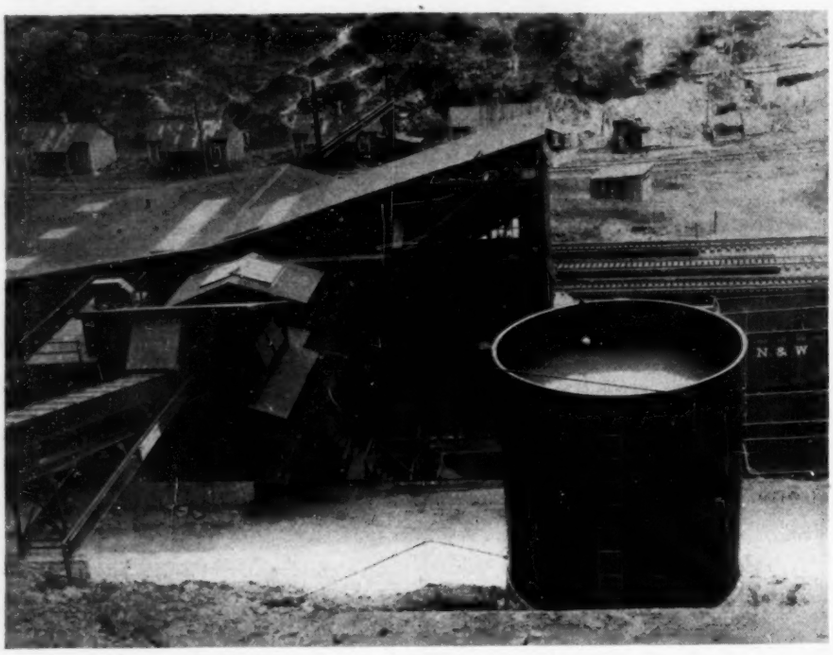
Mechanical loading also is calling for added control devices in Utah, especially where some type of conveyor is used. Three-phase squirrel-cage induction motors, either normal torque-normal reactance, or high torque-high reactance, are generally used, although in a few cases, where extremely low-voltage conditions are expected, wound rotor motors are used. However, this phase of coal mining is only in the experimental stage with no two mines in the territory trying the same experiments, so there is as yet no control system that can be called "standard."

Demand for Dustless Coal Becomes Insistent

Luxuries become necessities as the scale of living changes for the better. It appears that "dustless" coal is now being edged into the necessities column. Like the graveled road, once considered a luxury but now tolerated in many states as a main highway only when treated to mitigate the dust nuisance, dusty coal is finding less tolerance every season.

Nine modern tipples in the smokeless field of West Virginia are now equipped to ship "dustless" coal. The treatment consists of spraying the product on the loading boom with a solution said to consist chiefly of calcium and magnesium chloride.

The accompanying photograph shows the 10,000-gallon solution tank at the tipple of the Upland Coal & Coke Co.,



Solution Feeds by Gravity to the Loading Booms

Elkhorn, W. Va. Other equipment consists of a small mixing vat, centrifugal pump and spray nozzles on the loading booms. The treatment is used principally on egg but at times is used also on stove, nut, and mine-run.

The coal so treated remains damp at ordinary humidity and does not freeze in zero weather unless some of the chemical is washed off by a heavy rain.

Patents covering the use of deliquescent materials in solution for conditioning fuels are claimed by the Fuel Process Co., Charleston, W. Va., which sold the equipment for the nine plants and which furnishes the chemical.

The installations include the following: Page Coal & Coke Co., Pageton, W. Va.; Crozer Coal & Coke Co., Elkhorn, W. Va.; Pocahontas Fuel Co., Boissevain, Va.; Winding Gulf Colliery Co., Winding Gulf, W. Va., and the New River Co., at Whipple, Cranberry and Summerlee, W. Va.

Grounding Machine Frame Stops Arcs

European practice in regard to grounding the frames of a.-c. mining machines leaves little or no chance for operating a machine with the ground connection broken.

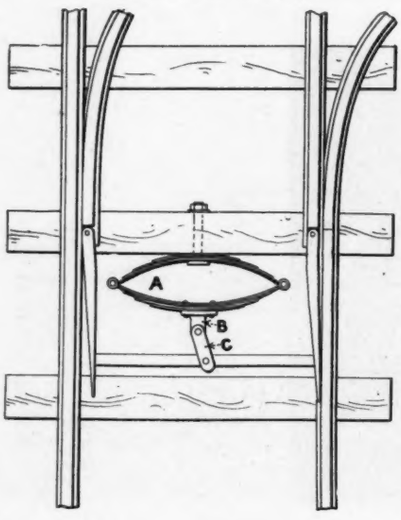
In addition to the three power conductors the portable cable contains two conductors which ground the cutting machine frame to a permanent ground at the entry and form a continuous circuit through a low-voltage relay. In case the ground connection is broken the current through the relay fails, causing this relay to lock out an automatic line switch located at the power or entry end of the portable cable.

Current for the continuous flow through the grounding conductors is supplied by a low-voltage transformer of small capacity that is located in the box with the automatic switch.

Spring Switch for Foot Of Plane

With a leaf spring taken from the seat of a farmer's wagon a switch at the foot of a plane, says J. A. Cosgrove, superintendent Piedmont & George's Creek Coal Co., Westernport, Md., has been thrown automatically without a single failure for five years. In the sketch, *A* shows the spring, *B* an extension riveted to the spring, *C* a 6-in. link drilled at both ends for ¾-in. bolts, one of which attaches it to the spring and the other to a brace joining the two points.

Hasn't Failed in Five Years

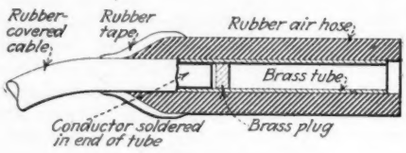


The passage of a car through the switch from the incline forces the points over and compresses the spring. As soon as the wheel has passed, the spring pushes the points back into place. In originally adjusting the switch, the tie to which the spring is attached was moved backward or forward till the most favorable location was found.

Connector Stands Water And Rough Handling

Use of portable pumps and air compressors in the pits at strip mines calls for cable connectors or power plugs which will stand being dragged over rocks and through puddles of water. The accompanying sketch shows the female half of a power plug being used on 440-volt three-phase service in strip pits of the United Electric Coal Cos.

The rubber air hose which forms the insulated handle is rubber cemented to the brass tube. The plug in the tube serves only to keep the solder from running through. In order to insure good contact with the male plug, which is a slotted rod, the tube is reamed to accurate size. The back portion of the male is insulated with hose which is tapered and wrapped with rubber tape in the same manner as shown in the sketch of the female.



Female Half of Connector

R. C. Vorderstrasse, chief electrician for the company, states: "This is a very inexpensive connector to make and the most serviceable I have ever seen. You can drop it as often as you please and drag it through the mud without injury. The air-hose handles never loosen. We use these connectors at all our mines. They are out in all weather with approximately 500 volts on them."

Master Filter Added to Individual System

Application of an individual oil filtering system to each generator was a forward step in power equipment lubrication. Now the latest method is to add a master filtering system which feeds continuously to each individual system, thus automatically replacing the losses. Overflow from the individual units is recirculated through the master filter.

Need New Way to Handle Railroad Cars

Good practice in handling railroad cars from empty yard to tipple calls for gravity on a uniform grade of about 2 per cent. But, according to E. L. Berger, superintendent of Zeigler No. 2 mine, Zeigler, Ill., the time has come when a large mine should have a more positive method of handling railroad cars at the tipple.

"There is no such thing as an ideal grade," says Mr. Berger. "Effects of temperature, condition of cars, and snow are too great. Level tracks with some positive means of car control would be better than a gravity yard. At present it is a problem yet to be solved, at least as regards details."

Modern production methods on a large scale are getting away from doing regular jobs in ways which leave any uncertainty as to speed and which may require one man one day but several men the next day. Many tipples are now equipped with a small hoist for moving stubborn cars, but something more definitely appropriate is required for perfect control of all cars from the far end of the empty yard on through the tipple.

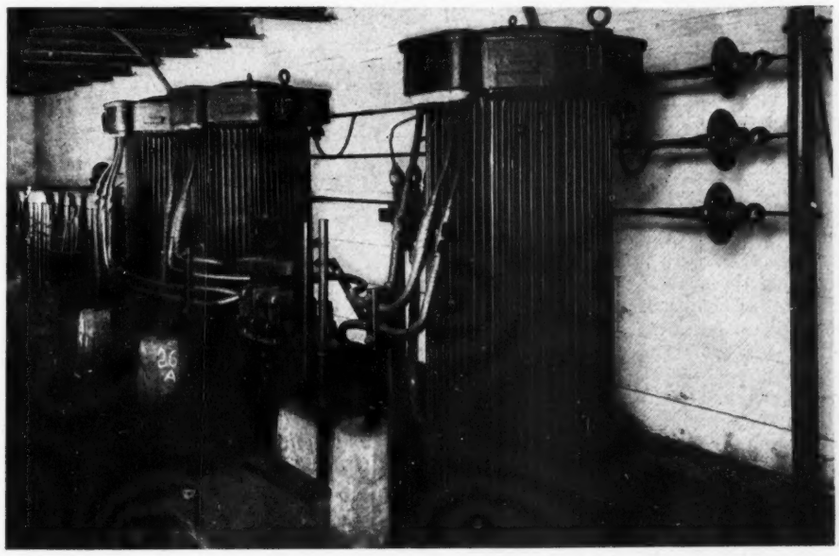
Fiber Ducts Protected by Concrete Pedestals

It is a primary principle with the Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., to avoid entirely the use of potheads and to avoid so far as possible the use of multiple-conductor cables in the wiring of large motor and control equipments.

On the larger and more important installations wires are carried in fiber conduits under the concrete floors and a separate duct is provided for each conductor. The conduits terminate in 90-deg. bends projecting above the floor and protected by concrete pedestals.

The accompanying photograph shows this type of construction in an underground substation at the Bessie coal mine. The concrete pedestals around the cables, leading to the starting switch and converter transformers, protect the ducts from mechanical injury and against entrance of water that may get on the floor.

Converter Substation in Bessie Mine



Motor-Generator Losses Show in Comparison

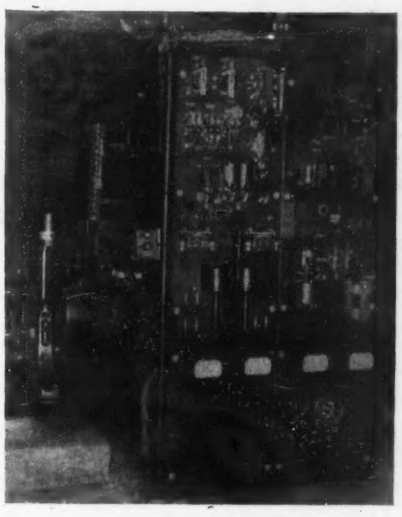
Comparative power consumptions for shaft hoisting in balance by two combinations of ordinary methods are indicated admirably by the following figures from mines in the same section of West Virginia.

At one, where the cars are hoisted and the equipment is powered by a d.c. motor supplied through a flywheel motor-generator set, the average for a typical month was 1.8-kw.-hr. per ton. At the other mine, where skips are used and the drive is a slip-ring induction motor, the average for a month of equal production was 0.6 kw.-hr. per ton, or one-third the other figure. The shafts are about the same depth.

"Full-Automatics" Now Taking Alabama

Full-automatic substation control has not replaced the manual controls as rapidly in Alabama as in the rest of the Appalachian bituminous region. In the last year, however, a number of full-automatic controls were installed.

For instance, in the Bradford mine of the Alabama By-Products Corporation, at Dixiana, one of the inside substations has been changed to full-automatic, and the company contemplates changing another soon.



Panels in Bradford Mine

The unit on which the manual control was replaced is a 150-kw. synchronous motor-generator set. The motor is rated 1,200 r.p.m., 2,300 volts, 225 hp. The control equipment, which includes a d.-c. panel made by the Automatic Reclosing Circuit Breaker Co., was furnished by the Cutler-Hammer Mfg. Co.

The unit operates in parallel with a 150-kw. manually controlled motor generator located about a mile away. Duty on the full-automatic set is rather severe because it is located beside the main haulway without appreciable length of line to aid in limiting the current in case of a short-circuit on the haulway.

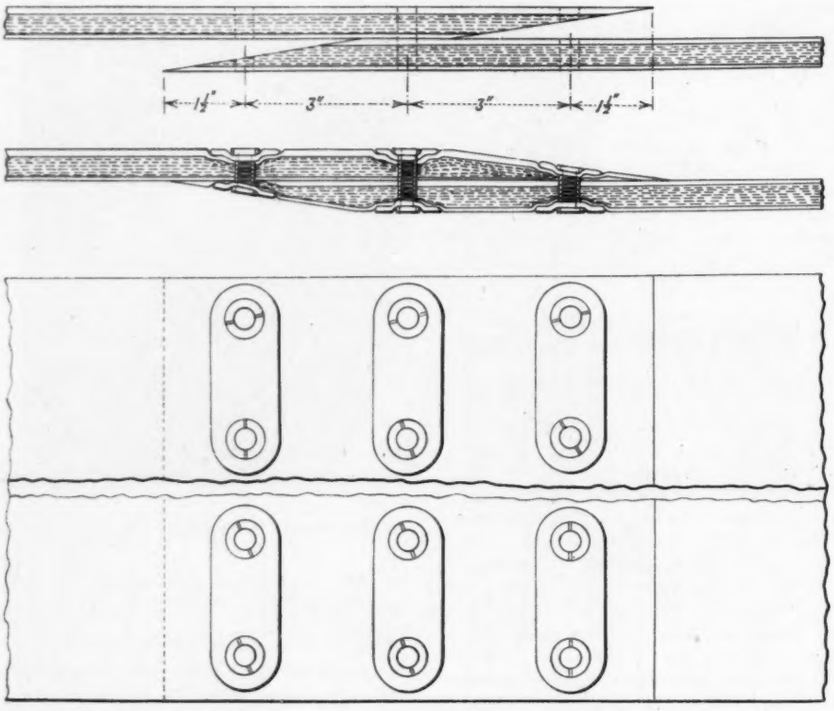
According to W. C. Chase, superintendent of the division, the full-automatic control is saving two twelve-hour man shifts.

Lap Splice Is Favored For Conveyor Belts

Butt joints secured with metal fastners have been the standard for conveyor belts, but such joints do not have a tensile strength equal to that of the belt, and furthermore they cause the belt to fail first at the joint.

A splice which is proving in service to be superior to the butt joint is being advocated by the Birmingham branch of the Manhattan Rubber Manufacturing Co. This is a tapered lap joint made according to the accompanying sketch. It is recommended that "Flexco High Duty" fasteners be used to hold the pieces together.

Splices of this type have been in use over four years in the Birmingham district. Some old pieces of belt which had been taken out of service because of failures at the splices were put back into service with lap splices and gave addtional service exceeding that de-



Splice that Increases Service from Conveyor Belts

livered by the brand new belt with the butt splices.

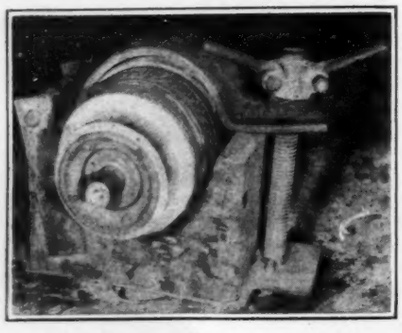
The lay splice has a tensile strength practically equal to that of the belt.

Clamp Holds Armature During Assembly

Lack of proper tools for a job is an irritation to a first-class electrician or mechanic, consequently a man's efficiency often can be judged by the tools he has provided.

Electrical men who have had experience at motor repair work remember times when they had to "chase an armature all over the floor" when assembling pinions, bearings or a clamping nut. Perhaps the excuse for not having some way of holding the armature from skidding and turning was that there were too many sizes of armatures in use.

Armature Held Tightly Without Damaging Coils



The accompanying photograph shows an armature clamp in the underground shop at Zeigler No. 2 mine of the Bell & Zoller Coal & Mining Co., Zeigler, Ill. The bottom half of the clamp is a wood block and the top half a wide band of steel padded with belting.

Projecting from the bottom is a large wooden peg which fits loosely in a hole in the floor and prevents the clamp from skidding. When not in use the device is picked up and stored near the wall.

Compulsory Partnership For Efficient Loading

Certain shifts in the coal mine of the Granby Consolidated Mining & Smelting Co., Cassidy, B. C., were greatly increasing their production at the expense of the others under a system of triple shifting. The mine was opened in 1918, according to John Bennett, Cassidy, B. C., and in 1919 the miners were placed on a contract basis, two miners working as a unit in a single place and having one tally number. However, the competition between shifts resulted in a practice of leaving the cleaning up, removal of refuse, timbering and similar preparatory activities for the men on the next shift, and created a very confused, irritating and often unsafe situation.

Compulsory partnership was proposed as a remedy in 1920 and has since worked admirably. Under this system, one tally number is assigned to each place rather than to a pair of miners. The six men comprising the three shifts then work under this same tally number. To insure each pair of miners doing their work they are given an alphabetical letter which, combined with their tally number, such as 24A, distinguishes them from the others. Slackness on the part of any pair may then be easily traced. At the end of the pay period, the total coal, timber, yardage and other payments due that tally number is divided equally among the six men working a place. This system insures a well-kept place, obviates shirking and promotes safety.

Raise Generator Capacity By Use of Hydrogen

Explosion-proof cases for electric generators and the use of hydrogen gas instead of air for the cooling medium is a late development in power-plant practice. Hydrogen, which is inflammable, is so much better as a carrier of heat that a generator equipped with a closed cooling system filled with this gas is capable of delivering approximately 25 per cent more current than if cooled by air.

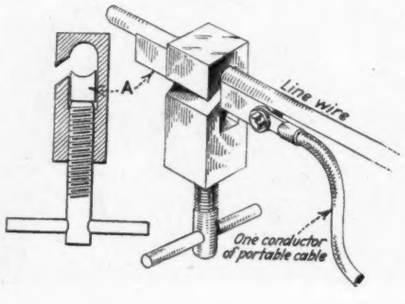
No Wrench Required for Line Connection

For making connection between pole line wires and the terminals of a high-voltage portable cable feeding an electric stripping shovel, R. C. Vorderstrasse, Lewistown, Ill., chief electrician of the United Electric Coal Corporation, uses connectors of his own design.

These are shown in the accompanying sketch. The body is made from a piece of 1x1-in. brass stock and is 2½ in. long. "A" is a copper bar to which the cable conductor is fastened and which is forced tightly against the line wire by a ½-in. brass setscrew. The T-handle of the setscrew, a piece of ¼-in. round steel, is the only part which will rust.

Mr. Vorderstrasse calls attention to the fact that there are no springs to give trouble and says that experience with this connector shows that the joint is held absolutely tight.

Showing Section of Connector and Its Use



WORD *from the* FIELD

Labor Organization Formed By Illinois Operators

Formation of the Illinois Coal Operators' Labor Association, launched during the third week of October, marks an important development in industrial relations in Illinois. The new organization, which supersedes the Coal Operators' Association of Illinois, was formally organized at a meeting in the Auditorium Hotel, Chicago.

Joseph D. Zook, vice-president and general manager of the O'Gara Coal Co., was chosen president and chief commissioner of the association. He will retire from the O'Gara company and devote his entire time to the new organization. The executive board consists of W. J. Jenkins, Consolidated Coal Co. of St. Louis (chairman); D. W. Buchanan, Old Ben Coal Corporation; John Henderson, Perry Coal Co.; J. E. Hitt, Northern Illinois Coal Co.; M. F. Peltier, Peabody Coal Co.; F. S. Pfahler, Superior Coal Co.; Paul Weir, Bell & Zoller Coal & Mining Co. L. H. Smith, Spring Valley Coal Co., is treasurer.

The objects of the new association are to promote stable, just, harmonious and business-like relations between the coal operators of Illinois and their employees. Efforts will be made to secure in labor contracts a recognition of the legitimate needs and rights of the employers; to aid in inforcing contracts between the coal operators of Illinois and their employees; to see that suspension of operations in violation of contract is visited with adequate penalties; to see that any member of the association suffering from strikes in violation of contract is sustained and supported, and reimbursed by those violating the contract; to promote business-like methods in negotiating contracts and in operating under them; to provide means for the interpretation of labor contracts, and in general to promote in all lawful ways the interests of the coal operators of the state.

Rate Bureaus Merged

Three coal rate committees in the Pittsburgh district have been merged in a new organization to be known as the Western Pennsylvania Coal Traffic Bureau, which absorbs the Pittsburgh Operators' Lake Rate Committee, the Pittsburgh Eastern Coal Rate Committee and the Pittsburgh Northern Coal Rate Committee.

The new traffic bureau at its organization meeting elected the following directors: J. D. A. Morrow, president, Pittsburgh Coal Co.; S. Pemberton Hutchinson, of Philadelphia, president, Westmoreland Coal Co.; T. W. Guthrie, vice-president, Hillman Coal & Coke Co.; H. T. Wilson, president, Pittsburgh Terminal Coal Corporation; George H. Francis, secretary, Keystone Coal & Coke Co.; B. H. Canon, general manager, Clinton Block Coal Co., and R. Templeton Smith, secretary, Poland Coal Co. A. B. McElvany was elected secretary of the new body. The work of the Western Pennsylvania Coal Traffic Bureau will be similar to that of the former committees, it was stated, except that it will "function in a broader way and more constantly and aggressively."

Joseph D. Zook

Fuel Consumed by Utilities Fell in September

Public utility power plants in the United States consumed 3,420,109 net tons of coal during September, a decrease of 20,214 tons from the figure for the preceding month, according to a report by the U. S. Geological Survey. Fuel-oil consumption by these plants in September totaled 599,949 barrels, as against 607,661 barrels in August.

The average daily production of electricity by public utility power plants in September exceeded all previous figures of average daily production, with an output of 242,300,000 kw.-hr. per day, which exceeded the average in August by a small margin. The usual seasonal decline in the production of electricity by the use of water power due to the decreasing flow of power streams during the summer continued during September.

Pennsylvania Names Its New Electrical Inspectors

Governor John S. Fisher of Pennsylvania has approved the appointment of the following inspectors of electrical equipment as nominated by Secretary of Mines Walter H. Glasgow: G. Frank Newman, of Uniontown, with offices in that city; Clyde H. Maize, of Uniontown, stationed at Greensburg; James T. Gatehouse, of Johnstown, to operate from that city, and Michael Lecorchick, of Erie, with headquarters at Pittsburgh.

All four men are practical electricians and have obtained leaves of absence from coal and electrical companies. They will make inspections of electrical equipment in the mines of the western part of the state. As announced last month, the Department of Mines has decided on these emergency appointments to prevent the recurrence of bituminous coal disasters, five of which, all major, occurring during the present year, have been attributed to faulty electrical equipment.

A. K. Morris Named to Head Hard-Coal Traffic Bureau

The Anthracite Operators' Conference has created a traffic bureau and Andrew K. Morris has been appointed to head this activity with the title of traffic commissioner for the industry. Mr. Morris will resign his present position of vice-president and general manager of the Pennsylvania Coal Co. and Hillside Coal & Iron Co. He was connected with the Erie R.R. for 23 years, resigning the position of coal traffic manager of that system in 1920.

The scope of Mr. Morris's new duties include the effort to secure reasonable adjustments of rates when necessary to meet competition and retain or extend anthracite markets. He also will represent the industry in all rate cases and conduct a continuous study of rates in relation to marketing conditions, competing soft-coal rates, comparative rates on domestic and steam sizes, etc.

Mr. Morris's headquarters are with the New York office of the Anthracite Operators' Conference, 120 Broadway.

Supreme Court to Hear Lake Rate Appeal

Chief Justice Taft has announced that the lake cargo coal rate cases, involving an injunction prohibiting the Interstate Commerce Commission from stopping Southern railroads from making a 20 per cent reduction on coal to lake ports seemingly is properly before the U. S. Supreme Court.

Under the rules of the court it was

necessary for the United States and the Interstate Commerce Commission, the Barton Coal Co., the Pittsburg operators' lake rate committee and the Baltimore & Ohio and other Northern railroads seeking to set aside the restraining order issued by a statutory federal court at Charleston, W. Va., to file with the Supreme Court statements showing the questions at issue and the jurisdiction of the Supreme Court to pass on them.

After examining these jurisdictional briefs in all the cases, Justice Taft said: "The court finds that probable jurisdiction had been shown." This means that the jurisdictional question, never considered seriously in these cases, has been settled, and that the cases are now in line to be heard on the appeals.

Industrial Coal Stocks Continue to Climb

Bituminous coal stocks in the United States continued to expand during September, this being the second advance in succession since April 1, 1927, according to the monthly report of the National Association of Purchasing Agents. The increase was about 700,000 tons for the month.

Consumption during September however, also increased 1⅓ million tons, so that the number of days' supply of anthracite and bituminous coal on hand in industries in the United States and Canada, based on the current rate of consumption, actually decreased. On Oct. 1 there was 35 days' supply on hand compared with 37 days a month previous. Total stocks of hard and soft coal in the United States and Canada Oct. 1 were 40,778,000 net tons, against 40,090,000 tons on Sept. 1.

DAYS' SUPPLY OF SOFT COAL IN VARIOUS INDUSTRIES

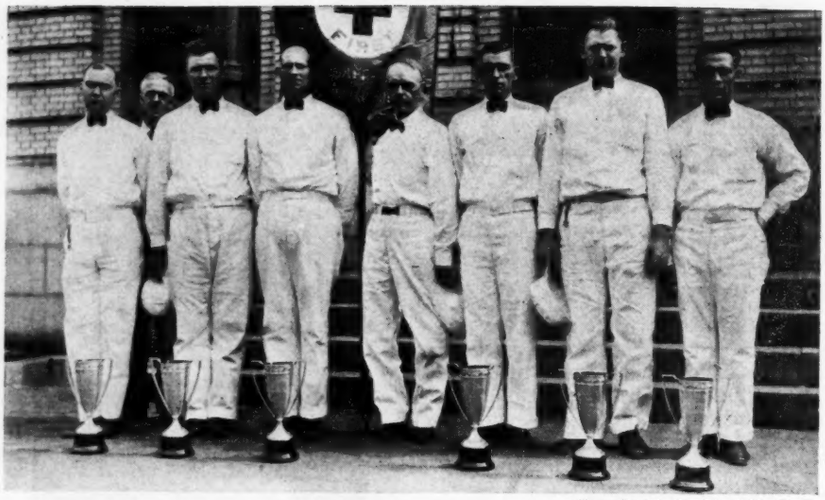
		Change
Byproduct coke	22	1
Electric utilities and coal-gas plants	52	3
Railroads	31	2
Steel mills	31	2
Other industries	36	—
Average total stocks throughout the country	35	2

ESTIMATES OF OUTPUT, CONSUMPTION AND STOCKS

(In Net Tons)

	U. S. Production	Industrial Consumption	On Hand in Industries
Oct.	51,400,000	35,813,000	60,154,000
Nov.	47,100,000	35,514,000	57,940,000
Dec.	47,309,000	37,225,000	55,725,000
Jan.	49,645,000	37,678,000	52,909,000
Feb.	46,933,000	36,301,000	50,595,000
March	49,452,000	38,588,000	48,388,000
April	39,081,000	35,230,000	47,432,000
May	44,748,000	34,844,000	43,670,000
June	41,264,000	32,784,000	40,890,000
July	41,785,000	33,527,000	40,700,000
Aug.	48,598,000	33,890,000	39,415,000
Sept.	48,332,000	35,223,000	40,090,000
Oct. 1			40,778,000

Bituminous coal stocks held by railroads of the country on Oct. 1 showed a decrease of 998,206 tons from the reserves held on Aug. 15, according to reports made to the American Railway Association. Total stocks held by the carriers on Oct. 1 were 9,872,659 tons, consisting of 2,034,085 tons in cars and 7,838,574 tons in ground storage.



Nunnally Studio, Bluefield, W. Va.

Winners Supply Missing Prize

Six watches were the award for the winning team in the first-aid meet at West Virginia Safety Day, held at Bluefield, Sept. 22, but the victorious team was composed of seven members. Therefore the victors chipped in and bought a watch for the seventh man. The Carolina team of the Consolidation Coal Co., which took first place, is shown above. Left to right: Will West (captain), Fred Bedale (in rear), safety engineer; Joe Beardine, Joe Morris, W. A. Bagshaw, Harry Hatfield, Frank Cunningham and Tony Lorry.

Indiana Agreement Follows Illinois Base; Mechanized Mines on Flat $9 Rate

INDIANA coal operators and miners reached an agreement at Terre Haute Oct. 18 on wages similar to the one now in effect in Illinois. In the vote on ratification of the pact, announced Oct. 31, the miners registered approval by 7,627 to 4,469. The mines reopened under the new scale Nov. 1. The Indiana contract runs for two years, expiring March 31, 1930. In Illinois the contract is for four years. In general the Indiana agreement is patterned after the Illinois settlement. It provides for a basic day wage of $6.10 with 91c. a ton as the pick mining rate.

The scale for mechanized mines is a flat $9 a day wage without a tonnage rate on machine mining. In Illinois the machine rates are $8.04 for men loading on conveyors and $10.07 for miners employed on loading machines. Indiana operators are given the right to provide only two rooms for two men. Under the Jacksonville scale the mine owners were compelled to provide three rooms for two men.

An important feature of the new agreement is the provision that in the event of failure to settle a dispute by a member of the district executive board of the United Mine Workers and the superintendent of a mine "it shall then be referred to the president of district No. 11, United Mine Workers of America, and the commissioner of the Indiana Bituminous Coal Operators' Association, whose decision shall be final, but should they fail to agree they shall submit the question in dispute in writing with other pertinent evidence either side elects to present, to one or two conciliators selected by them, and should they fail to agree on conciliators, then a conciliator agreed to by the joint executive board shall function. The joint executive boards of each association shall agree to three men to act as prospective conciliators to take up all cases where the president of district No. 11 and the commissioner of the operators' association fail to decide same, and from the three men agreed upon the president of district No. 11 and the commissioner of the operators' association each shall strike out one name, then the one chosen shall have authority to handle the question submitted to him in writing, which will cover the evidence submitted when the case was heard by the president of the United Mine Workers and the commissioner of the operators' association. If for any reason the one chosen is unable to act, then he is authorized to choose one of the prospective conciliators."

Very few additional mines have reopened in Indiana under the new scale. The principal ones operating are those which were running temporarily under the Jacksonville agreement. They are the only ones where the operators feel that they can afford to run under the relief obtained.

"Wildcat" strikes embarrassed Illinois operators during October in spite of the settlement of the wage controversy between the mine owners and the union officials, effective Sept. 15. Many miners were dissatisfied with the terms of the agreement and they voiced their opposition by heckling the operators and the union leaders and refusing to return to work under conditions imposed by the new scale.

An Expression of the Rising Standards Of Industrial Journalism

Nothing could be more significant of the growing importance of the service to industry now rendered by the modern "institution of the press" than the announcement just made of the expansion of the executive direction of the McGraw-Hill Publishing Co., publishers of *Coal Age*. The fact that James H. McGraw, founder and president of the company, has been made chairman of the board and Malcolm Muir elected to the presidency is but an expression of a profound development that has been taking place in business journalism. Impressive as the recent progress of this organization has been, it is but the reflection of an evolution of fundamental importance to American business in which Mr. McGraw and Mr. Muir have been outstanding leaders.

The McGraw-Hill Publishing Co. has been before the public conspicuously of late. The acquisition of the publications of the A. W. Shaw Co., of Chicago, last June added to this group of prominent engineering, industrial and trade papers the *Magazine of Business* and *System*, which carried its influence into the field of general business. Later the purchase of *Textile World* and its affiliated publications marked the entry of this organization into another great basic industry. And today there are under this one management 24 national magazines serving the engineering profession, 10 major industries and the business executive. At the same time the company also is the largest publisher of scientific and technical books in the world.

The success of this enterprise has been founded above all else upon a very broad conception of editorial responsibility and leadership to which Mr. McGraw has tenaciously adhered since the beginning of his journalistic career 43 years ago and which in the beginning was considered entirely too idealistic to be practical. It was the simple principle that the editor's prime obligation is to his industry, a responsibility to provide a functioning "fourth estate" for the service of that professional or industrial community to which his readers belong. It has resulted in the evolution of a high standard of editorial initiative and leadership without which the modern world of business could hardly exist for lack of self-expression and the interchange of experience and news.

Throughout his 23 years of active association with Mr. McGraw, Mr. Muir has been a forceful champion of these editorial ideals and has in turn made a notable contribution to the improvement of the marketing philosophy of industry. As vice-president of the McGraw-Hill Publishing Co. and during his recent term as president of the Associated Business Papers, Inc., he has inspired and aided in the direction of a movement within industry to apply engineering principles to market study as a more efficient substitute for rules of thumb and old fashioned hit-or-miss advertising and selling. Out of his leadership has come a new approach to the broad problem of industrial marketing through the analysis of buying habits and the crystallizing of definite principles that guide the approach to markets and eliminate the waste of old time guess-work. During his administration as president of the A.B.P. marked progress was achieved in elevating the general standards of business-paper publishing. This is a non-profit organization for the co-

Malcolm Muir

operative upbuilding of the trade, industrial and vocational publications of the country in their service to industry and commerce.

Mr. Muir therefore assumes the presidency of the McGraw-Hill institution with a splendid background of practical experience and executive responsibility, for he has not only worked his way up through the organization from the bottom but has taken a leading part in the actual expansion of the company. He has had an important influence in the development of the vital spirit of the organization and of its service to its half million subscribers and the forty-five hundred industrial advertisers who reach the marketplace through McGraw-Hill publications.

In the broadened scope of the company's activities, with its correspondingly greater responsibilities and opportunities for service, this division of the top burden of executive direction brings new strength to the organization and promise of an increased capacity for service to industry. Mr. McGraw will continue no less actively in the work but will be enabled to devote himself more freely to the inspiration and guidance of the editorial leadership of these many publications to which he has given such absorbing interest for so many years. Mr. Muir's proved sympathy and enthusiasm for the principles for which McGraw-Hill papers have stood so consistently for so long is a complete assurance of their continuance as the basic policy of this house. It is a guarantee that the same progressive influence which McGraw-Hill has brought to the support of business journalism can be expected to go forward unflagging in its constructive service to the upbuilding of American industry.

Elect Wiley President

The Kanawha Coal Operators' Association held its annual meeting Oct. 18 at the Kanawha Country Club, Charleston, W. Va. In the forenoon there was a business session, addressed by Harry L. Gandy, executive secretary of the National Coal Association. These officers were elected: Colonel W. M. Wiley, vice-president, Boone County Coal Corporation, president; F. O. Harris, general manager, Cannelton Coal & Coke Co., vice-president; J. L. Dickinson, vice-president, Dickinson Fuel Co., treasurer; D. C. Kennedy, secretary, and these directors: Frank Enslow, president, West Virginia Southern Coal Co.; John Laing, president, Wyatt Coal Sales Co.; W. C. Mitchell, general manager, Hatfield-Campbell Creek Coal Co.; C. A. Cabell, president, Carbon Fuel Co.; L. M. Webb, president, Webb Coal Mining Co.; J. Dearing Christian, assistant to the president, Imperial Colliery Co.; John S. McKeever, general superintendent, Kanawha & Hocking Coal & Coke Co.

Anthracite Shipments Decline From Year Ago

Shipments of anthracite for the first half of the coal year 1928-1929, as reported to the Anthracite Bureau of Information, Philadelphia, Pa., totaled 28,983,636 gross tons, as compared with 32,221,413 gross tons during the corresponding period in the preceding coal year.

Shipments by originating carriers during each month from April to September, 1928, and the total for the six months were as follows:

Railroads	April	May	June	July	August	September	Coal Year to End of September, 1928
Reading Co.	1,140,985	1,158,499	649,692	708,589	1,050,137	832,356	5,540,258
Lehigh Valley	899,376	1,058,954	705,314	570,094	881,381	769,794	4,884,913
C.R.R. of N. J.	531,892	639,049	395,420	292,009	585,245	498,015	2,940,630
D.L. & W.R.R.	899,398	904,956	699,685	458,674	747,978	726,427	4,437,118
Delaware & Hudson	671,633	810,667	385,686	398,519	731,741	501,223	3,499,469
Pennsylvania R.R.	519,233	517,617	419,246	336,980	460,655	448,414	2,702,145
Erie R.R.	517,282	641,482	408,509	395,182	517,351	484,768	2,964,574
N.Y., Ontario & Western	121,083	160,318	121,537	68,785	125,985	124,536	722,244
Lehigh & New England	295,817	328,431	146,054	96,898	217,990	207,095	1,292,285
Total	5,596,699	6,218,973	3,931,143	3,325,730	5,318,463	4,592,628	28,983,636

Study and Cure of Industry's Weak Spots To Feature N.C.A. Convention

STUDY of the weak spots in the position of the bituminous coal industry at the present time and consideration of the best means of curing them will feature the eleventh annual convention of the National Coal Association at the Hotel Cleveland, Cleveland, Ohio, Nov. 14-16. In the words of executive Secretary Harry L. Gandy, the industry "has measured up to its responsibilities in the field of production, but, as is the case with many other industries, it has an unsatisfactory record in the field of realization." It is in the hope of improving the latter situation that the program of the meeting has been built.

At the first general session, to be held Nov. 14, at which D. A. Thomas, president, Montevallo Coal Mining Co., Birmingham, Ala., will be chairman, S. A. Taylor, Pittsburgh, Pa., will discuss "The Cost of Maintaining Excess Potential Capacity." The attitude of the purchaser of coal will be told at the second general session by T. W. Harris, Jr., vice-president, National Association of Purchasing Agents, with W. D. Brennan, Stag Canon Branch, Phelps Dodge Corporation, Dawson, N. M., in the chair. F. W. Shibley, vice-president of the Bankers' Trust Co. and a director of the Consolidation Coal Co., will bring the financial viewpoint to the delegates at the third general session, when M. J. Bracken, president, Argyle Coal Co., Johnstown, Pa., will preside.

The fourth general session will be devoted to a discussion of the feasibility and the advisability of an effort for a trade-practice conference which would specifically define those unfair trade practices which are harmful to the well-being of the industry. P. M. Snyder, president, C. C. B. Smokeless Coal Co., Mount Hope, W. Va., will be chairman. The influence of the federal government, the program makers point out, already has been thrown in the balance to aid this movement, that so far as possible trade and industry may regulate their own affairs. The Department of Justice, the Department of Commerce and the Federal Trade Commission are giving active support and assistance in these efforts, which have thus far covered a wide range, although the movement is yet pretty much in its infancy. Lumber, mill-work, fertilizer, the petroleum industry, motion pictures and the wax paper industry are among the lines where efforts have been made to correct unfair practices.

The items in trade-practice resolutions which have been adopted at conferences regularly called, with approval of the government, may be divided into three classes: (1) Those where the unfair practices mentioned are in and of themselves a violation of law; (2) those practices which in the judgment of industry or of trade are harmful and should be dispensed with, but which in and of themselves are not violations of statutory law, and (3) items on which the government looked with specific disapproval. The Federal Trade Commission is endeavoring to assist industries and various lines of trade in the elimination of the practices covered in the first two of those classes of items.

Discussing the possibilities involved in this movement, Mr. Gandy, in an address at the annual meeting of the Kanawha Coal Operators' Association last month, said:

"I can well understand the hesitancy with which some would approach this effort, for they have fresh in their minds the long series of legislative proposals for the regulation of the bituminous coal industry. It is vastly different, though, to say by law that a specific act, such as burglary, is a crime, than it is to attempt to supervise all the conduct of individuals. Looking at this trade practice movement, I have no hesitancy in saying that it presents an entirely different picture from that of governmental regulation. It seems to me entirely within the realm of possibilities for this industry to define what are unfair practices, harmful to its well being.

"Unquestionably that movement should be double-barreled: Both local and national. No commitments have been made, the whole subject has been approached in an inquiring frame of mind to find out whether it holds possibilities for good. Personally, I am of the opinion that it does. I grant you the road is long and the way at times may be tiresome, but there seems to be no short cut."

In addition to these four general themes there will be discussions on a number of other topics, including government relations, safety, research and taxation. Local association officials will have a meeting on the afternoon of the first day and the board of directors of the organization will hold its final session at the same time. A reunion dinner of present and former directors will be staged that evening.

George Martinson

Newly elected chairman of the mining section of the National Safety Council, named at the recent convention held in New York City. Mr. Martinson is safety engineer of Pickands, Mather & Co., Hibbing, Minn.

Mining Education Broadens In West Virginia

One of the outstanding activities undertaken this season by the mining extension department of West Virginia University, in response to popular demand and sponsored by Robert M. Lambie, chief of the State Department of Mines, is the establishment of an elementary course in coal mining in the high schools for young men who desire to enter mining as a profession. Classes already are being taught at Gary and Berwind and it is expected that 25 schools will establish the courses by next year. Coal geology, mine gases, safety lamps, ventilation, explosives, mining methods, mine fires and explosions, mine law and first aid are the subjects to be covered.

Educating mining men under the grade of superintendent to enable them to better their position and to create a reservoir of trained men whose knowledge will be of assistance to the coal industry in West Virginia is the object of the comprehensive extension work being carried on under the direction of the School of Mines, West Virginia University. This extension work, according to Prof. C. E. Lawall, is not confined only to training men to be foremen but includes the introduction of high school pupils to the chief industry of their state and the training of foremen to better understanding and discharge of the duties of their position in the economic life of the industry.

The mining extension department of West Virginia University was started in 1914 with one instructor and has since grown to employ 8 teachers who hold classes at 33 towns each week. In 1927 1,279 men were enrolled, which included 90 mine foremen, 117 assistant mine foremen, 183 haulage men, 38 superintendents, 42 electricians, 10 transit men, 1 general manager and others. Courses of study in mine gases, safety lamps, ventilation, timbering, explosives, mine fires and explosions, mining methods, haulage, electricity in mines and drainage and pumping are included in the curriculum, and certificates are awarded those who do satisfactory work.

In the New River field extension classes were first established in 1920 and 600 men have since been awarded certificates. Approximately 30 per cent of these were mine foremen. The mining extension department and the New River Coal Operators' Association have outlined a foremen's development course. The enrollment will be 150 men and classes will be held at Mount Hope and Beckley. Classes will be held two nights a week.

Eminent Technicians to Take Leading Part In International Coal Conference

ACCORDING to the preliminary program for the Second International Conference on Bituminous Coal to be held under the auspices of the Carnegie Institute of Technology, Pittsburgh, Pa., from Nov. 19 to 24, more than one hundred speakers representing twelve nations will take part. In addition, several other countries will be represented, it is expected, by either official delegates or visitors.

Sessions of the conference will be held in Carnegie Music Hall and in various halls of the Carnegie Institute of Technology. Afternoons will be devoted chiefly to sectional meetings, of which there will be as many as five going on simultaneously. Evening features during the week will include a dinner given in honor of the speakers by President Thomas S. Baker, Monday night; a public meeting to hear addresses by Dr. E. E. Slosson, Director of Science Service, and Dr. E. W. Smith, of England, on Tuesday night; a smoker on Wednesday night; a banquet for the public on Thursday night, and a public meeting on Friday night to hear an address by Georges Claude, eminent French scientist and inventor.

Beginnning Monday, Nov. 19, the morning session will be devoted to registration. Following addresses of welcome, Lord Melchett (Sir Alfred Mond), will discuss "Coal Problems in Perspective" and Dr. Karl Krauch, Ludwigshafen am Rhein, will have a paper on "Hydrogenation of Coal."

Several general sessions are included in the program. Tuesday morning papers will be read by Dr. Fredrich Bergius, Heidelburg, Germany; Dr. Cecil Lander, London, and F. zur Nedden, Berlin.

Speakers at the Wednesday morning session include Prof. S. W. Parr, University of Illinois; Prof. Fritz Hofmann, Breslau, and Paul Dumanois, Paris.

Dr. David White, U. S. Geological Survey; Howard N. Eavenson, Pittsburgh, Pa., and F. G. Tryon, U. S. Bureau of Mines, will present papers at the general session on Thursday morning. Dr. Hugh S. Taylor, Princeton University; Dr. Arthur D. Little, Cambridge, Mass., and Dr. H. C. Parmelee, editor, *Chemical and Metallurgical Engineering,* New York, will read papers at the general session Saturday.

Low-temperature distillation problems will be discussed by W. A. Darrah, president, Continental Industrial Engineers, Inc., Chicago; Col. W. A. Bristow, London; F. L. Tenney, consulting engineer, Milwaukee, Wis.; M. J. McQuade, president, Ben Franklin Coal Co. of West Virginia, Pittsburgh, Pa.; Prof. F. P. Kerschbaum, Frankfurt, Germany; T. Ban, Tokio, Japan; C. J. Goodwin and G. N. White, London; A. W. Gauger, director, Division of Mines and Mining Experiments, University of North Dakota; Josef Plassman, Duisberg; Paul Weiss, Paris; Charles Turner, Glasgow; A. Leaute, Paris; W. H. Allen, Jr., chemical engineer, American Gas & Electric Co., New York; Harald Nielsen, London; R. H. Crozier, London; Dr. R. P. Soule, chief technologist, International Coal Carbonization Co., New York; Prof. Edgar Stansfield, University of Alberta; Julien Pieters, Paris, and Dr. S. P. Burke, research director, Combustion Utilities Corporation, Linden, N. J.

High temperature distillation will be discussed by Edgar C. Evans, London; Prof. Ernst Terres, Braunschweig; D. W. Wilson, vice-president, Dry Quenching Equipment Corporation, New York City, and Dr. Carl Otto, Bochum.

Papers on the origin, composition and classification of coal will be read by Prof. P. E. Raaschou, Copenhagen; A. C. Fieldner, chairman, American Engineering Standards sectional committee on the classification of coal and chief chemist, U. S. Bureau of Mines, Washington, D. C.; M. R. Campbell, senior geologist, U. S. Geological Survey; Ralph H. Sweetser, American Rolling Mill Co., Columbus, Ohio; Dr. Chozo Iwasaki, Sendai, Japan; Dr. George L. Stadnikoff, Moscow; Dr. Ing. Fran Podbreznik, Belgrade; Marcel Loum; A. C. Noe, University of Chicago; Dr. Reinhardt Thiessen, U. S. Bureau of Mines; Prof. E. C. Jeffrey, Harvard University, and Prof. Paul LeBeau, Paris.

Problems in connection with pulverized fuel will be discussed by Rudolph Pawlikowski, Gorlitz; Baurat Walter Kleinow, Henningsdorf; Dr. George E. K. Blythe, London; Dr. Ing. I. P. Goosens, Aachen; by Dr. Ing. P. Rosin, Dresden; Henry Kreisinger, research engineer, Combustion Engineering Corporation, New York City; H. F. Daniels, president, Riley Stoker Co., Worcester, Mass., and D. Frank Crawford, Pittsburgh, Pa.

At the sessions on purification and cleaning papers will be presented by Dr. R. Lessing, London; Dr. Karl Glinz, Berlin; Dr. F. W. Sperr, Jr., director of research, Koppers Co., Pittsburgh, Pa.; A. France, Liége; Byron M. Bird, U. S. Bureau of Mines, Birmingham, Ala.; James B. Morrow, research engineer, Pittsburgh Coal Co., Pittsburgh, Pa.; Prof. Dr. Franz Fischer, Mulheim-Ruhr, and F. R. Wadleigh, consulting fuels engineer, Consolidated Gas Co., New York City.

"Some Aspects of the Hydrogenation of Coal," is the title of a paper to be given by J. Ivon Graham, Birmingham, England. Papers also will be read by E. Audibert, Senlis; Galileo Guardabassi, Milan; André Kling, Paris, and Daniel Florentin, Paris.

Other sessions will be devoted to discussion of fertilizers, fuel oils, power and combustion, gases, and tars and oils.

Oppose Watson Coal Bill

The board of directors of the United States Chamber of Commerce, which met at Hot Springs, Ark., recently, authorized the executive officers to oppose any features of the Watson coal bill (S. 4490), now pending before the Congress, which "would contravene the policies of the Chamber as adopted in referendum and resolution." The bill provides for bringing the bituminous coal industry under the regulatory control of the government and making the control effective through the operation of a bituminous coal commission which would provide for licensing coal operators.

McAuliffe to Be Director Of Mining Society

At the directors' meeting of the American Institute of Mining and Metallurgical Engineers, New York City, Oct. 25, Frederick W. Bradley, Bunker Hill & Sullivan Mining & Concentrating Co., of San Francisco, Calif., was nominated by the committee appointed for that purpose as president for the ensuing year to succeed George Otis Smith, the present incumbent.

Eugene McAuliffe, president, Union Pacflic Coal Co., Omaha, Neb., was put in nomination as a director as also was H. A. Buehler, Missouri state geologist, of Rolla, Mo. Other nominations for director are Edgar Rickard, New York City; F. W. Paine, Boston, Mass.; H. S. Mudd, Los Angeles, Calif.; E. V. Daveler, Butte, Mont., and W. R. Wright, Chicago, Ill.

Coming Meetings

American Management Association. Autumn convention, Nov. 13-15, Palmer House, Chicago, Ill.

National Coal Association. Eleventh annual meeting, Nov. 14-16, Cleveland Hotel, Cleveland, Ohio.

Second International Conference on Bituminous Coal, Carnegie Institute of Technology, Pittsburgh, Pa., during week of Nov. 19.

Harlan County Coal Operators' Association. Annual meeting at Harlan, Ky., Nov. 23.

West Virginia Coal Mining Institute. Meeting and banquet, Dec. 3 and 4, at Beckley, W. Va.

American Society of Mechanical Engineers. Annual meeting, Dec. 3-7, at Engineering Societies Building, 29 West 39th St., New York City.

Seventh National Exposition of Power and Mechanical Engineering, Grand Central Palace, New York City, Dec. 3-8.

American Mining Congress. Thirty-first annual meeting, Dec. 5-8 inclusive, Mayflower Hotel, Washington, D. C.

Southern Appalachian Coal Operators' Association. Annual meeting, Dec. 7, at Knoxville, Tenn.

Iowa Coal Operators' Association. Annual meeting at Des Moines, Iowa, Dec. 11.

Coal Mining Institute of America. Annual meeting Dec. 12, 13 and 14, at Pittsburgh, Pa.

Cunningham Chosen Head Of Truax-Traer Co.

The Truax-Traer Coal Co., which operates coal-stripping plants at Kincaid and Velva, N. D., and the recently acquired properties of the Black Servant and Forsyth Coal companies in Jackson County, Illinois, has opened general offices at 1907 McCormick Building, Chicago. Walter H. Cunningham, who has been president of West Virginia Southern Coal Co., has assumed the presidency of the Truax-Traer Coal Co., which will act as sales agent for the West Virginia Southern Coal Co.'s coals.

Frank Enslow, of Huntington, W. Va., the former vice-president of the West Virginia Southern Coal Co., has been elected to the presidency.

Personal Notes

JOHN BRYDON, who last July succeeded Joseph P. Jennings as general superintendent of the Pennsylvania Coal Co., has been made vice-president in charge of operations, succeeding A. K. Morris. C. H. Fredericks, former auditor, has been promoted secretary-treasurer of the company, replacing F. H. Wright, who resigned. G. Marshall Gillette, superintendent for several months, has now become general manager of the Pennsylvania, Hillside Coal & Iron and the New York, Susquehanna & Western companies. Under the new arrangement the positions of general superintendent and assistant general superintendent have been abolished.

HARRY TREADWELL, who has been chief operating engineer for the Chicago, Wilmington & Franklin Coal Co. for the past several months, has been promoted to general superintendent with headquarters at Benton, Ill. Mr. Treadwell entered the organization a few years ago in a minor capacity.

WILLIAM N. CUMMINS has joined the Emmons Coal Mining Co. in the capacity of vice-president, with headquarters in the Packard Building, Philadelphia, Pa. Prior to his new connection he was general manager of the Red Jacket Consolidated Coal & Coke Co., Columbus, Ohio.

HOWARD S. ESTILL has severed his connection with the Stonega Coke & Coal Co., of Big Stone Gap, Va., as general superintedent and has opened a consulting engineer's office at 812 Fayette Bank Building, Lexington, Ky.

THE POSITION of chief inspector of mines for Alberta, which was left vacant by the resignation of John T. Stirling, has been filled by the appointment of Andrew Millar, manager of the Saunders Ridge Coal Co.

RALPH E. TAGGART, of Big Stone Gap, Va., vice-president of the Stonega Coke & Coal Co., has been elected president of the First National Bank of Appalachia. He succeeds the late Creed F. Blanton, of Big Stone Gap, who died suddenly a short time ago.

W. M. Wilshire

The Consolidation Coal Co. announces the appointment of W. M. Wilshire as Western sales manager, with headquarters in the Bankers Building, Chicago. He succeeds M. E. Fleming, resigned. Mr. Wilshire was with the company from 1905 *to* 1923, *in various executive capacities, including that of general manager of sales from* 1919 *to* 1923. *This position Mr. Wilshire resigned in* 1923 *to become vice-president of the Carnegie Coal Co. In* 1925 *he was elected president of the West Virginia Coal & Coke Co.*

Shows Ways to Use Statistics

A companion to the Safety Practices Pamphlet No. 21 has been prepared by the National Safety Council. The earlier pamphlet describes the means suggested for collecting and tabulating statistics. The new publication will indicate the manner in which these statistics may be used. It will be numbered 86 and will be entitled "How to Use Industrial Accident Statistics." Criticisms are requested in a letter addressed to members.

Explosions, Not Fires

D. Harrington, chief engineer, safety division, U. S. Bureau of Mines, Washington, D. C., writes as follows:

"Referring to the October issue of *Coal Age,* I note that you have quoted me on p. 658, as follows:

"Of 29 coal-mine fires, 14 causing 282 deaths were from this cause [electricity]; 10 causing 48 deaths were from open lights; 3 causing 9 deaths were from explosives; and 2 causing two deaths were from unknown causes. For 'coal-mine fires' the words 'coal-mine explosions' should be substituted."

Obituary

TREVOR B. SIMON, construction engineer, Consolidation Coal Co., Fairmont, W. Va., died suddenly Oct. 28 of heart trouble. Mr. Simon was at one time mining engineer for the Shawmut Mining Co., later with the Jeffrey Manufacturing Co. and still later president of the C. L. Miller Co. of Scottdale, Pa. He was a graduate of Ohio State University.

Washington Letter

BY PAUL WOOTON
Special Correspondent

COAL came in for little attention during the campaign. It was not mentioned by the Republicans. The Democrats used it only as an example to show that the Republicans had been unable to do anything for a depressed industry. It was coal's brother source of power, the hydro-electric resources, that received principal attention in the campaign.

Undoubtedly the discussion of the subject, especially as expounded by Charles Evans Hughes and Mr. Hoover, has served to dispel some popular illusions as to the extent of the potential water power available in the country.

Bituminous coal undoubtedly has been feeling the competition of water power, as it is estimated that the fuel equivalent of the latter type of power developed since the passage of the water power act in 1920 represents an annual consumption of 20,000,000 tons of coal. The rapid improvement of fuel efficiency at the steam electric plants, however, is acting to limit the power sites that can be developed economically, it was brought out repeatedly in the campaign.

The record for low cost of fuel power is that held by the Long Beach plant of the Southern California Edison Co., which is given by that company as being 4.2c. per kilowatt hour at the bus bar. This very low cost is made possible by high thermal efficiency and also by the very low price at which oil is obtained from nearby fields. Even at higher fuel costs the best of the steam stations now are producing at extraordinarily low costs. The cost of many stations is below 0.9c. and at some of them it is less than 0.6c.

Every reduction in fuel power costs tends to restrict further the water power that can be developed to advantage. In this connection the public is learning that there is no such thing as the average cost of water power. Water power is a resource the cost of which varies enormously, depending on conditions. At one extreme are low-head mill dams of past generations, on small streams with great irregularity of flow. At the other extreme are a few sites, of which Niagara Falls is the most perfect example, characterized by high heads, immense volume and regular flow, calling for relatively small investment for diversion works. Hydro-electric power is produced at Niagara at about 0.2c. per kilowatt hour. Some of the larger companies there, according to their reports to the New York Public Service Commission, actually sell their entire output for a little over 0.2c.

Between these two extremes range the many potential water powers of the country. A few, like Niagara, still have a large advantage over fuel power. Others cannot compete under present conditions and still others are in the doubtful class.

Mechanization Advance to Get Impetus At Mining Congress Convention

ADVANCEMENT in mine mechanization, improved production and marketing methods and congressional legislation affecting the mining industry, including federal taxation of mines, will be considered by the American Mining Congress at its 31st annual convention, to be held in Washington, D. C., Dec. 5 to 8. The board of directors has appointed a committee to arrange the program for the meeting, which will be held in the Mayflower Hotel.

In connection with the main convention sessions, meetings will be held by the boards of governors of the Manufacturers' Division and of the Southern Division of the American Mining Congress. These organizations will decide on the time and place to hold the annual convention of practical coal-operating officials and exposition of coal-mining equipment and machinery and the annual Southern Industrial Development Conference in 1929. For the past several years the coal convention and exposition has been held at Cincinnati, while the industrial development conference is held yearly in a different Southern city.

Plans will be launched at the December meeting to enlarge on a nationwide scale the survey which the American Mining Congress has been conducting as to the extension of the use of machines in coal mining through the committee recently appointed covering all the leading coal operators in each coal-producing state. Dr. L. E. Young, vice-president and general manager of the Pittsburgh Coal Co., heads the committee as national chairman. J. D. Zook, of Chicago, president of the Illinois Coal Operators' Labor Association and formerly general manager of the O'Gara Coal Co., is vice-chairman.

Creation of the new committee is an outgrowth of an investigation conducted by the American Mining Congress through Glenn B. Southward, its mechanization engineer, during the last two years under the mining and loading section of the National Standardization Division, of which Col. Warren R. Roberts, of Chicago, president of Roberts & Schaefer Co., is chairman of the coal mining branch.

The national committee will include the following state chairmen:

Alabama—D. A. Thomas, Birmingham, president and treasurer, Montevallo Coal Co.

Arkansas and Oklahoma — J. G. Puterbaugh, McAlester, Okla., president, McAlester Fuel Co.

Colorado and New Mexico — D. A. Stout, Pueblo, Colo., chief engineer of mines, Colorado Fuel & Iron Co.

Illinois — L. D. Smith, Chicago, vice-president, Chicago, Wilmington & Franklin Coal Co.

Indiana—David Ingle, Oakland City, president, Ayrshire Coal Co.

Ohio—Ezra Van Horn, Cleveland, general manager, Clarkson Coal Mining Co.

Western Pennsylvania—W. L. Affelder, Pittsburgh, assistant to the president, Hillman Coal & Coke Co.

Central Pennsylvania — E. J. Newbaker, Windber, general manager, Berwind-White Coal Mining Co.

Anthracite Field of Pennsylvania—J. B. Warriner, Lansford, vice-president, Lehigh Coal & Navigation Co.

Utah—D. D. Muir, Salt Lake City, vice-president, United States Smelting, Refining & Mining Co.

Southern West Virginia—M. L. Garvey, Macdonald, general manager, New River Co.

Northern West Virginia and Maryland—F. R. Lyon, Fairmont, W. Va., vice-president, Consolidation Coal Co.

Wyoming and Montana — Edward Bottomley, Kleenburn, Wyo., general superintendent, Sheridan - Wyoming Coal Co.

State chairmen for Iowa, Missouri and Kansas, and for Virginia, Kentucky and Tennessee are in process of selection.

The following have been appointed chairmen of committees handling specialized mining practices:

Cutting and Shearing—George Campbell, Chicago, assistant to the president, Old Ben Coal Corporation.

Mechanical Loaders — Paul Weir, Zeigler, Ill., vice-president, Bell & Zoller Coal & Mining Co.

Year Book — Prof. A. C. Callen, Urbana, dean of the School of Mines, University of Illinois.

Drilling and Blasting—E. E. Jones, Lillybrook Coal Co., Lillybrook, W. Va.

Conveyors—Newell G. Alford, consulting engineer, Pittsburgh.

Scrapers—Cadwallader Evans, Scranton, Pa., general manager, Hudson Coal Co.

Transportation—R. L. Ireland, Jr., Cleveland, general manager, M. A. Hanna Co. bituminous coal mines.

Roof Action—R. Y. Williams, consulting engineer, Pottsville, Pa.

Coal Cleaning—H. D. Smith, Bluefield, W. Va., assistant to the president, Ashland Coal & Coke Co.

Management—W. D. Brennan, Dawson, N. M., general manager, Phelps-Dodge Corporation.

Safety—Thomas Dawson, Pittsburgh, Pa., vice-president, H. C. Frick Coke Co.

Publicity—John M. Carmody, New York, editor, *Coal Age*.

Chairmen of committees on ventilation and power are in process of selection. The district chairmen will be announced Dec. 1.

To Hold Field Day Events

The annual field day of the Gallup American Coal Co. will be held at Gamerco, N. M., on Nov. 12. On the program are scheduled a first-aid contest, a mine rescue contest, a timbering contest and numerous other events.

State Inspectors Stimulate Safety Work in Alabama

Interest in safety work in Alabama has been greatly stimulated by the state force of mine inspectors under the direction of W. B. Hillhouse, chief inspector. The force (reading from left to right in the accompanying illustration) consists of J. A. Fox, W. L. Meill, E. E. Nichols, W. B. Hillhouse, Dabney Ramseur, S. Y. Leith, J. A. Ivie, George Park and W. P. Smith.

According to Mr. Hillhouse's report on the coal mines in Alabama for 1927, 27,152 men employed inside and outside produced 20,190,926 tons of coal from 213 mines. A total of 93 fatal accidents occurred in 1927 as against 139 in 1926, the rate being one fatality for every 217,106 tons produced in 1927 and for every 154,739 tons in 1926. The year passed without any one accident causing more than two deaths. During the year 1,680 inspections were made, consuming 1,801 days underground, and 107 fatal and non-fatal accidents were investigated.

Watering and rock-dusting have been, and now are being, extensively done in Alabama mines, 64 operations doing rock-dusting at the end of 1927—a substantial increase over the preceding year.

Alabama Mine Inspection Force

148 Die in Mine Accidents in September; Death Rate Lower Than Year Ago

Accidents in the coal-mining industry of the United States in September, 1928, caused the death of 148 men, according to reports received from state mine inspectors by the U. S. Bureau of Mines. The production of coal for the month was 47,337,000 tons, of which 41,301,000 tons was bituminous and 6,036,000 tons was anthracite. Of the 148 fatalities reported, 113 were in bituminous mines in various states and 35 in the anthracite mines of Pennsylvania. Fatality rates based on these figures were 2.74 and 5.80, respectively, for bituminous and anthracite mines, while the industry as a whole showed a rate of 3.13 per million tons of coal produced.

The record for September, 1927, showed 173 fatalities, 135 of which occurred in bituminous mines and 38 in anthracite mines, 48,359,000 tons of coal was produced, 41,763,000 tons of which was bituminous and 6,596,000 tons was anthracite. The corresponding rates were 3.58 for the industry as a whole, 3.23 for bituminous and 5.76 for anthracite. Thus, while the anthracite rate for September, 1928, showed a slight increase, the total rate and that for bituminous showed a decrease. This also is true as compared with the record for August of the present year.

Reports for the first nine months of 1928 show that accidents at coal mines caused the loss of 1,580 lives as compared with 1,709 for the same period of 1927. The production of coal thus far in 1928 is 407,471,000 tons, showing a fatality rate of 3.88 per million tons produced; that for January to September, 1927, was 452,253,000 tons with a fatality rate of 3.78.

There were no major disasters—that is, accidents which caused the death of 5 or more men at one time—during September, but there have been 11 such disasters, resulting in the death of 308 men, since the first of January of the present year. There were 8 major disasters during the corresponding months of 1927, with a resulting loss of 155 lives, no major disaster occurring during September of 1927. Death rates per million tons of coal produced, based exclusively on these disasters, were 0.756 and 0.343 respectively for the 1928 and 1927 periods.

Comparing the accident records for the nine-month period of January to September, 1928, with the same months of 1927, a reduction is noted in the death rates from falls of roof and coal, haulage, explosives and electricity. The comparative rates for the nine-month periods of 1927 and 1928 and for the year 1927 are as follows:

	Year 1927	Jan.–Sept. 1927	Jan.–Sept. 1928
All causes	3.732	3.779	3.878
Falls of roof and coal	1.922	1.891	1.831
Haulage	.594	.590	.567
Gas or dust-explosions			
Local explosions	.154	.155	.098
Major explosions	.259	.314	.756
Explosives	.184	.179	.130
Electricity	.167	.179	.164
Other causes	.452	.471	.332

To Pursue Experiments With Powdered Coal

The National Fuel and Power Committee appointed by the National Board of Trade of Great Britain has recommended that further experiments looking toward the use of pulverized coal aboard ships be conducted by the mining and shipping industries as well as by the government. The British Blue Star Line has equipped one boiler on one of its vessels for the use of this type of fuel and is now adapting another, following successful experiments in its use.

Process Plant for Ontario

The Illingworth process of coal carbonization is to be brought into operation at Prescott, Ontario, Canada, according to Major S. J. Robins, president of the Canadian Carbonized Coals, Ltd., who has just returned from England, where he investigated this process. Plans have already been made to construct a plant at Prescott capable of handling 300 tons of soft coal per day, producing a solid smokeless fuel. Bituminous coal from Nova Scotia is to be brought up the St. Lawrence throughout the navigation season in sufficient quantity to enable the plant to continue operating throughout the winter months. The Illingworth process is described by Major Robins as low-temperature carbonization operating at 600 deg. centigrade.

Coal-Mine Fatalities During September, 1928, by Causes and States

(Compiled by Bureau of Mines and published by *Coal Age*)

State	Underground												Shaft					Surface							Total by States	
	Falls of roof (coal, rock, etc.)	Falls of face or pillar coal.	Mine cars and locomotives.	Explosions of Gas or Coal Dust	Explosives.	Suffocation from mine gases.	Electricity.	Animals.	Mining Machines.	Mine fires (burned, suffocated, etc.).	Other causes.	Total.	Falling down shafts or slopes.	Objects falling down shafts or slopes.	Cage, skip or bucket.	Other causes.	Total.	Mine cars and mine locomotives.	Electricity.	Machinery.	Boiler explosions or bursting steam pipes	Railway cars and locomotives.	Other causes	Total.	1928	1927
Alabama	1	....	1	....	....	....	1	....	....	....	....	3	....	....	....	....	....	....	....	....	....	....	....	....	3	7
Alaska	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0
Arkansas	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0
Colorado	1	1	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	2	4
Illinois	11	....	1	....	....	....	....	....	....	....	2	14	....	....	....	....	....	....	....	....	....	....	....	....	14	3
Indiana	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	4
Iowa	2	....	1	....	....	....	....	....	....	....	....	3	....	....	....	....	....	....	....	....	....	....	....	....	3	0
Kansas	1	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1	2
Kentucky	11	....	1	....	....	....	2	....	....	....	....	14	....	....	....	....	....	....	....	....	....	....	....	....	14	18
Maryland	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	2
Michigan	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0
Missouri	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	1
Montana	1	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1	1
New Mexico	2	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	2	2
North Dakota	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....	....	....	1	0
Ohio	4	....	1	....	....	....	....	....	....	....	....	5	....	....	....	....	....	....	....	....	....	....	....	....	5	5
Oklahoma	2	....	....	....	....	....	1	....	....	....	....	3	....	....	....	....	....	....	....	....	....	....	....	....	3	4
Pennsylvania (bituminous)	10	1	5	....	1	....	....	....	....	....	1	18	....	....	....	....	....	....	....	....	....	....	....	....	18	31
Tennessee	....	....	....	....	....	....	1	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1	1
Texas	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	2
Utah	1	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	1	....	....	....	....	....	1	2	1
Virginia	3	....	1	....	....	....	....	....	....	....	....	4	....	....	....	....	....	....	....	....	....	....	....	....	4	4
Washington	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	1
West Virginia	15	6	8	....	....	....	2	1	2	....	....	34	....	....	....	....	....	1	....	....	....	....	1	2	36	40
Wyoming	2	....	1	....	....	....	....	....	....	....	....	3	....	....	....	....	....	....	....	....	....	....	....	....	3	2
Total (bituminous)	67	8	20	....	1	....	7	1	2	....	3	109	....	....	....	1	1	2	....	2	....	....	1	3	113	135
Pennsylvania (anthracite)	15	4	5	....	3	....	1	1	....	....	2	31	....	....	....	....	....	....	....	2	....	2	....	4	35	38
Total, September, 1928	82	12	25	....	4	....	8	2	2	....	5	140	....	....	....	1	1	2	3	....	2	....	2	7	148	....
Total, September, 1927	89	14	24	7	6	2	8	1	1	....	5	157	....	....	1	1	2	3	3	2	1	....	5	14	.....	173

Current Prices of Mining Supplies

SINCE LAST MONTH

MOST of the changes which occurred during the mbnth in prices of mining supplies were advances. Cast-iron pipe rose $2 per ton at Birmingham; steel plates, 5c. and rivets, 10c. per 100 lb., Pittsburgh; copper wire, ¾c. per lb. at Chicago. Important increases also developed in waterproof brattice cloth, scrap metals and trolley wire. Slightly downward tendencies have been noted during the last two months in railway ties, mining machine and locomotive cable. Prices of practically all metals are in a firmer position than at this time last month.

STEEL RAILS—The following quotations are per gross ton, f.o.b., in large mill lots:

	Pittsburgh	Birmingham	Chicago
Standard Bessemer rails	$43.00	$43.00	$43.00
Standard open-hearth rails	43.00	43.00	43.00
Light rails, 25 to 45 lb	36.00	34@36	36@38

TRACK SUPPLIES—The following prices are base per 100 lb. f.o.b. Pittsburgh mill for large mill lots, together with warehouse prices at Chicago and Birmingham:

	Pittsburgh	Chicago	Birmingham
Standard spikes, 5/16-in. and larger	$2.80	$3.55	$3.00
Track bolts	3.80	4.55	3.90
Standard section angle bars, splice bars or fishplates	2.75	3.40	3.00

WROUGHT STEEL PIPE—On deliveries from warehouses at the places named the following discounts hold for welded steel pipe:

	Black		
	New York	Chicago	St. Louis
1 to 3 in. butt welded	50%	54%	49%
2½ to 6 in. lap welded	45%	51%	46%
	Galvanized		
	New York	Chicago	St. Louis
1 to 3 in. butt welded	36%	41%	36%
2½ to 6 in. lap welded	32%	38%	33%

WROUGHT-STEEL PIPE LIST

Size, Inches	List Price per Foot	Diameter in Inches		Thickness Inches
		External	Internal	
1	$0.17	1.315	1.049	.133
1¼	.23	1.66	1.38	.14
1½	.27½	1.9	1.61	.145
2	.37	2.375	2.067	.154
2½	.58½	2.875	2.469	.203
3	.76½	3.5	3.068	.216
3½	.92	4.0	3.548	.226
4	1.09	4.5	4.026	.237
4½	1.27	5.0	4.506	.247
5	1.48	5.563	5.047	.258
6	1.92	6.625	6.065	.28

CAST-IRON PIPE—Prices, f.o.b., per net ton, for bell and spigot pipe, Class B and heavier, in large mill lots:

	Birmingham	Burlington, N. J.	New York
4 in.	$39.00	$39.00	$41.60
6 in. and over	36.00	36.00	38.60

	Pittsburgh	Chicago	St. Louis	San Francisco
4 in.	$47.50	$47.20	$44.60	$49.00
6 in. and over	44.50	44.20	41.60	46.00

Gas pipe and Class "A," $3.00 per ton extra.

BOLTS AND NUTS—Discounts from list, Apr. 1, 1927, on immediate deliveries from warehouse in New York and vicinity: Machine bolts, square heads and nuts, up to 1x30-in., full packages, 50%; Carriage bolts up to ¾ x 6-in., full packages, 55%; Nuts, hot-pressed or cold-punched, blank or tapped, square or hexagonal, full packages, 55%.

STEEL PLATES—Following are base prices per 100 lb. in large mill lots f.o.b., for ¼-in. thick and heavier:

Pittsburgh..... $1.90 Birmingham..... $2.15

STRUCTURAL RIVETS—The following quotations are per 100 lb., in mill lots, f.o.b. mill, for ½-in.:

Pittsburgh.....$2.90 Cleveland.....$2.90 Chicago..... $3.00

WIRE ROPE—Discounts from list price on regular grades of bright and galvanized, base, in New York and territory east of Missouri River:

	Per Cent
Plow steel round strand rope	35
Special steel round strand rope	30
Cast steel round strand rope	20
Round strand iron and iron tiller	5
Galvanized steel rigging and guy rope	7½
Galvanized iron rigging and guy rope (add to list)	12½

DRILL ROD—Discounts from list at warehouse:

New York.....60% Cleveland.....55% Chicago.....50%

FRICTION TAPE—Size ½-in. in 100 lb. lots in Eastern territory, per lb., $0.29

RAILWAY TIES—For fair-sized orders, f.o.b., the following prices per tie hold:

	6 In. x 8 In. by 8 Ft.	7 In. x 9 In. by 8½ Ft.
Chicago, white oak, heart, untreated	$1.40	$1.78
Chicago, oak, empty cell creosoted	1.80	2.40
Chicago, oak, zinc treated	1.60	2.10
Chicago, Southern pine, creosoted	1.60	2.10
St. Louis, white oak, untreated	1.10	1.70
St. Louis, red oak, creosoted	1.45	2.40
St. Louis, sap pine or cypress, untreated	.80	1.30
Birmingham, Southern pine, untreated	1.10	1.25
Birmingham, Southern pine, creosoted	1.60	1.75

STEEL MINE TIES—Prices range from $0.38 to $0.60 per tie, f.o.b. Pennsylvania and West Virginia districts, depending on quantity, gage of track and weight of rail.

CALCIUM CARBIDE—In drums, round lots in New York market, per lb., $0.05@$0.06.

BRATTICE CLOTH—Prices f.o.b. cars New York, Philadelphia, St. Louis or Chicago, per sq.yd.:

Jute, 24-oz., double warp	$0.19½	Jute, waterproof	$0.24
Jute, 22-oz., single warp	.17½	Duck, waterproof	.35
Jute, 18-oz., single warp	.15	Duck, non-inflammable	.33

COTTON WASTE—The following prices are in cents per lb. for bale lots:

	New York	Cleveland	Chicago
White	10.00@13.50	16.00	15.00
Colored	9.00@13.00	12.00	12.00

MACHINE OIL—Medium bodied, in 55 gal. metal barrels, per gal., as follows:

New York.....$0.30 Cleveland.....$0.36 Chicago.....$0.36

SCRAP IRON AND STEEL—The prices following are f.o.b. per ton paid by dealers:

	New York Per Gross Ton	Chicago Per Gross Ton	Detroit Per Gross Ton
No. 1 railroad wrought	$11.75@$12.25	$14.00@$14.50	.....
Stove plate	8.75@ 9.00	14.00@ 14.50	.....
No. 1 machinery cast	15.00@ 16.00	16.50@ 17.00	$13.00@$13.50
Machine shop turnings	8.00@ 8.50	7.25@ 7.75	8.50@8.75
Cast borings	6.50@ 7.50	11.00@ 11.50	9.00
Railroad malleable	10.00@ 10.50	15.25@ 15.75	.....
Re-rolling rails	11.50@ 12.00	16.50@ 17.00	12.00@13.00
Re-laying rails, 56@60 lb	23.00@ 24.00	23.00@ 25.00	.....
Heavy melting steel, No. 1	12.00@ 12.50	14.00@ 14.50	12.50@12.75

SCRAP COPPER AND BRASS—Dealers' purchasing prices in cents per lb.:

	New York	Cleveland	Chicago
Crucible copper	13.75 @13.87½	13.75	12.75 @13.25
Copper, heavy, and wire	12.12½@13.75	13.00	12.12½@12.50
Copper, light, and bottoms	11.62½@11.87½	11.50	11.00 @11.50
Brass, heavy, yellow	7.62½@ 8.12½	8.50	8.00 @ 8.50
Brass, heavy, red	10.50 @11.00	.....	10.25 @10.75
Brass, light	6.12½@ 6.62½	6.75	6.75 @ 7.25
No. 1 yellow rod turnings	8.75 @ 9.25	9.50	8.75 @ 9.25

COPPER WIRE—Prices of bare wire, base, at warehouse, in cents per lb. are as follows:

New York..... 21.25 Cleveland..... 21.25 Chicago (mill) 17.50

TROLLEY WIRE—In carload lots, f.o.b. producing point, all sizes, per lb.:

Round..... $0.17125 Grooved..... $0.17375 Fig. 8..... $0.18125

TROLLEY WHEELS—Price f.o.b. Jersey City, N. J., each:

4-in..... $1.00 5-in..... $1.40 6-in..... $1.70

MINING MACHINE CABLE—F.o.b. producing point, net, per M. ft.:

No. 2 Duplex Flat, Braided		Two Conductor, Round Rubber Sheathed	
Size 2-133	$168.00	Size 2-133	$625.00
Size 3-133	150.00	Size 3-133	560.00
Size 4-133	132.00	Size 4-49	440.00

LOCOMOTIVE CABLE—F.o.b. cars, Trenton, N. J., single conductor, braided, net, on reels containing 1,500 ft., per M. ft.:

Size 3..... $85.00 Size 4..... $62.00

FEEDER CABLE—Price per M. ft. in larger buying centers east of the Mississippi River:

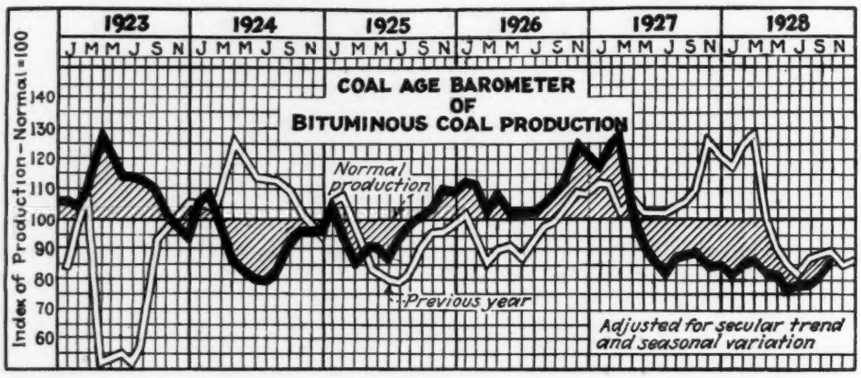
B. & S. Size	Two Conductor	Three Conductor
No. 14 solid	$31.00 (net)	$45.00 (net)
No. 12 solid	136.00	180.00
No. 10 solid	185.00	235.00
No. 8 stranded	305.00	375.00
No. 6 stranded	440.00	530.00

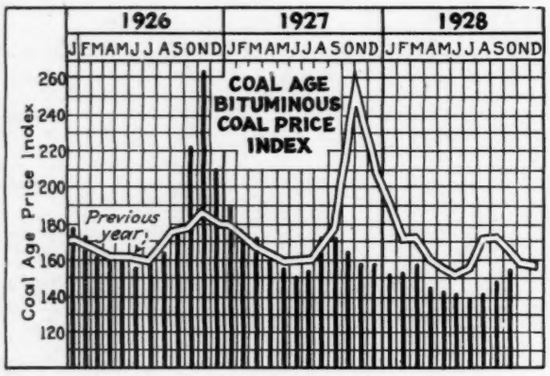
From the above lists discounts are: Less than coil lots, 50%; Coils to 1,000 ft., 60%; 1,000 to 5,000 ft., 65%; 5,000 ft. and over, 67%.

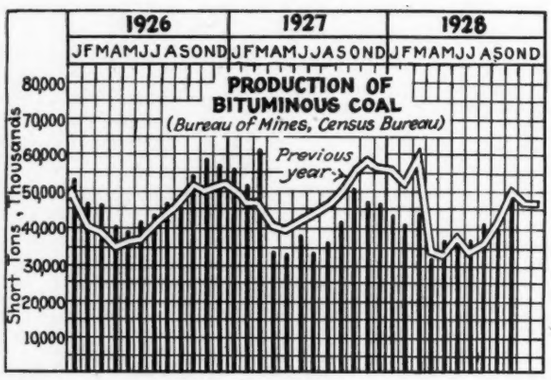
EXPLOSIVES—F.o.b. in carload lots:

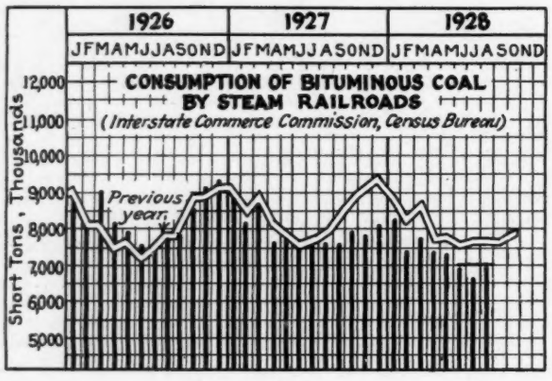
	Districts		
Black Powder FF, NaNO3 base, 800 kegs per car, per 25 lb. keg	West Virginia $1.70@$1.80	Pennsylvania $1.70	Missouri $1.75
Ammonium permissible 1¼ x 8 in. sticks, 20,000 lb. per car, per 100 lb.	14.00@15.00	13.75	14.00

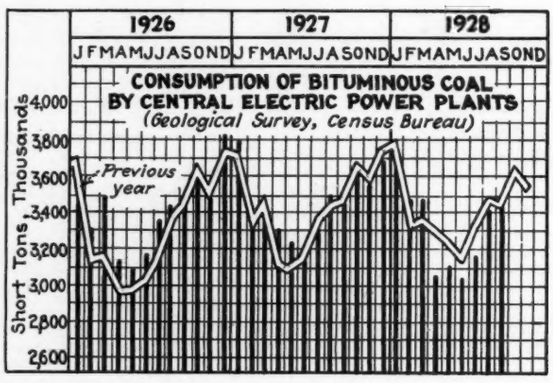
Indicators of Activities in the Coal Industry

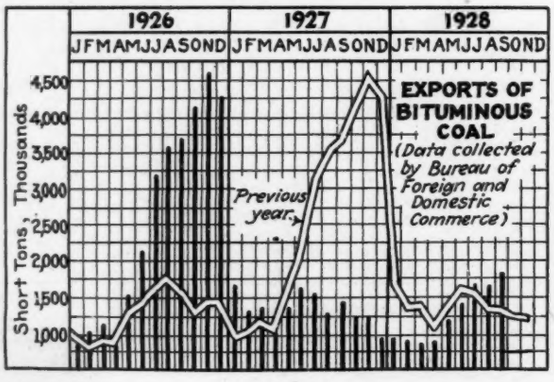


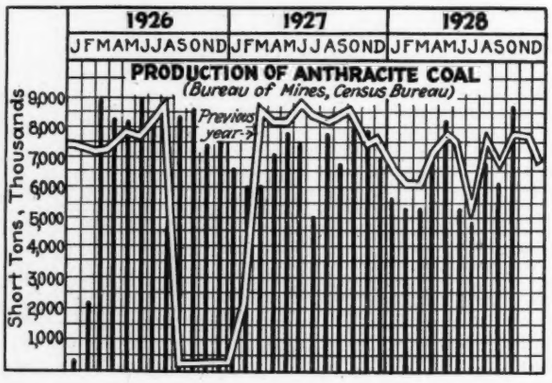












MARKETS *in Review*

A HIGHER LEVEL of average spot prices in the face of a substantial increase in output over September totals was the outstanding feature of the bituminous coal markets of the country during the past month. This development, however, was not the result of any broad, uniform major trend; on the contrary, it was the outcome of the interaction and reaction of a number of conflicting forces.

The increase in output reflected a slightly broader industrial market, heavier buying on the part of the domestic consumers and retail distributors over a wide area and the larger production from union districts where wage differences between operators and miners had been composed after the futile struggle of organized labor to continue the Jacksonville scale with its base day rate of $7.50. Inasmuch as a substantial portion of this tonnage carries a high sales price this increase had a marked effect upon country price levels.

Bituminous production last month, according to preliminary estimates of the U. S. Bureau of Mines, was 50,267,000 tons; the revised September total was 41,301,000 tons. The average per working day increased from 1,693,000 to 1,862,000 net tons. A year ago the output was 43,827,000 tons and the daily average was 1,686,000 tons. Last month's daily average was the highest so far made during the current year.

ABOUT 8 per cent of this tonnage was absorbed by the lake trade. Weekly dumpings at the lower ports last month averaged slightly over 1,000,000 tons. For the season to Oct. 29 the total cargo dumpings were 28,595,775 tons as against 29,386,218 tons for the corresponding period last year and 24,395,289 tons in 1926. This movement has acted as a safety valve for production in West Virginia and Kentucky.

Coal Age Index (preliminary) of spot bituminous prices in October was 154½; the revised September figure was 148½. By weeks the October figures were: 154, Oct. 6; 155, Oct. 13; 154, Oct. 20, and 155, Oct. 27. The corresponding weighted average prices were $1.86, $1.88, $1.86 and $1.88. Revised Index figures for September were: 147, Sept. 8; 146, Sept. 15; 150, Sept. 22, and 155, Sept. 29. The corresponding weighted average prices were $1.78, $1.77, $1.81 and $1.88.

October was a good month for anthracite with production rising to 8,621,000 net tons, as compared with 6,036,000 tons in September and 7,363,000 tons in October, 1927. The October daily average this year was 332,000 tons; for the preceding month the average was 252,000 tons. Stove was in particularly good demand; a number of large producers announced an increase of 15c. on this size effective Nov. 1.

UNEVENNESS, brought about by weather conditions, car supply and labor negotiations in Indiana, characterized developments in the Midwestern market during October. Low temperatures at the opening of the month made retailers eager to buy car numbers but, with the return of milder weather, retail demand began to drag and all coals except prepared smokeless and premium high-volatile Eastern grades felt the slowing up.

The abatement in demand for prepared sizes helped the market in fine coal, which had weakened after a short car supply on the Illinois Central earlier in the month had bolstered up screenings. Following this initial spurt the car situation was materially improved by the release to coal traffic of open-tops which had been used in construction work and inforcement of the rule counting "no bills" against supply hit the producers.

Sharp demand for prepared sizes failed to add strength to the smokeless mine-run market and shippers who brought in consignment coal of the last-named size suffered badly. Prices ranged from $1.65 to $2.25, with most standard coal at $2@$2.25. Lump and egg were $3.75@$4.25, with egg leading. Certain shippers have named a $4 price on November egg and $3.75 on lump. Stove was practically as active as egg; nut moved along with lump.

MIDWESTERN large coals fared less successfully although the leaders in the Illinois and Indiana fields maintained price levels. The general run of coal, however, was softer and western Kentucky offerings were weak with prices on lump dropping from $2@$2.25 to $1.75@$2 as buying lost its snap. Reduced output pending the new wage agreement helped the Indiana situation. The general market in screenings was firmer toward the close of the month.

Reports from the mining fields showed some labor disturbances accompanying the adoption of the new agreements in Illinois and Indiana. In one case the district organization revoked a local charter as punishment for an out-

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

		Week Ended							
		Oct. 6, 1928		Oct. 13, 1928		Oct. 20, 1928		Oct. 27, 1928	
	Market Quoted	Independent	Company	Independent	Company	Independent	Company	Independent	Company
Broken	New York	.....	$8.25@$8.50	.....	$8.25@$8.50	.....	$8.25@$8.50	.....	$8.25@$8.50
Broken	Philadelphia	$8.50@$8.75	8.25	$8.50@$8.75	8.25	$8.50@$8.75	8.25	$8.50@$8.75	8.25
Egg	New York	8.50@ 8.75	8.75	8.60@ 8.75	8.75	8.60@ 8.75	8.75	8.60@ 8.75	8.75
Egg	Philadelphia	8.75@ 9.00	8.75	8.75@ 9.00	8.75	8.75@ 9.00	8.75	8.75@ 9.00	8.75
Egg	Chicago*	7.82	7.82	7.82	7.82	7.82	7.82	7.82	7.82
Stove	New York	8.85@ 9.10	9.10	9.00@ 9.10	9.10	8.85@ 9.10	9.10	8.85@ 9.10	9.10
Stove	Philadelphia	9.10@ 9.35	9.10	9.10@ 9.35	9.10	9.10@ 9.35	9.10	9.10@ 9.35	9.10
Stove	Chicago*	8.13	8.13	8.13	8.13	8.13	8.13	8.13	8.13
Chestnut	New York	8.50@ 8.75	8.75	8.60@ 8.75	8.75	8.60@ 8.75	8.75	8.60@ 8.75	8.75
Chestnut	Philadelphia	8.75@ 9.00	8.75	8.75@ 9.00	8.75	8.75@ 9.00	8.75	8.75@ 9.00	8.75
Chestnut	Chicago*	7.82	7.82	7.82	7.82	7.82	7.82	7.82	7.82
Pea	New York	4.75@ 5.00	5.00	4.75@ 5.00	5.00	4.75@ 5.00	5.00	4.50@ 5.00	5.00
Pea	Philadelphia	5.00@ 5.25	5.00	5.00@ 5.25	5.00	5.00@ 5.25	5.00	5.00@ 5.25	5.00
Pea	Chicago*	4.45	4.45	4.45	4.45	4.45	4.45	4.45	4.45
Buckwheat	New York	2.85@ 2.35	[3.00@ 3.25†	3.00@ 3.25	3.00@ 3.25†	2.90@ 3.25	3.25†	2.75@ 3.00	3.00@3.25†
Buckwheat	Philadelphia	3.00@ 3.25	3.00@ 3.25	3.00@ 3.25	3.00@ 3.25	3.00@ 3.25	3.00@ 3.25	3.00@ 3.25	3.00@3.25
Buckwheat	Chicago*	1.50@ 2.25	2.25	1.75@ 2.25	2.25	1.75@ 2.25	2.25	1.50@ 2.00	2.25
Rice	New York	2.25@ 2.50	2.25	2.25@ 2.50	2.25	2.25@ 2.50	2.25	2.25@ 3.50	2.25
Rice	Philadelphia	1.25@ 1.75	1.70@ 1.75	1.15@ 1.75	1.70@ 1.75	1.15@ 1.75	1.70@ 1.75	1.00@ 1.50	1.70@ 1.75
Barley	New York	1.75@ 2.00	1.75	1.75@ 2.00	1.75	1.75@ 2.00	1.75	1.75@ 2.00	1.75
Barley	Philadelphia	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90

*Net tons, f.o.b. mines. †Domestic buckwheat, $3.75 (D. L. & W.)

law strike at Nokomis. In the Peoria field machine loading was under attack, with the enemies of the machine apparently successful in their efforts to impede the progress of mechanization.

Activities were well maintained at the Head of the Lakes during October and dock operators estimate that the shipments for the month closely approximated the September total of 25,000 cars. Mild weather in southern Minnesota and North Dakota held down outbound movement and most of the buying was on a hand-to-mouth basis. Credits were extended more cautiously and dealer payments were made more promptly.

STEADY demand for steam coals in the Northwest is hailed as proof of a substantial industrial expansion in that section of the country. Increased activity on the iron ranges is predicted this winter. Stocks of bituminous coal on hand as of Nov. 1 were estimated at 6,975,000 net tons; anthracite, 620,000 tons. Compared with Oct. 1 this was an increase of 505,000 tons in bituminous and a decrease of 20,000 tons in anthracite.

Except for an increase of 25c. in prepared smokeless at some of the docks, wholesale prices were unchanged at Duluth and Superior. In the Southwest a drop of 25c. in the quotations on Kansas screenings was the only change. Weather conditions created a dull market for all grades of Kansas coal but the steam trade at Kansas City held out against central Illinois slack.

Indian summer was charged with the responsibility for an off-color demand in Colorado and New Mexico. As a result of the high mercury the number of Colorado "no bills" jumped to 800 cars. October mine quotations were: Walsenburg-Canon City lump, $5.75; washed chestnut, $4.75; fancy chestnut, $3.25; Trinidad coking lump, $3.75; lump-and-nut, $3.50; fancy chestnut, $3.25; Crested Butte large anthracite, $9.50; brooder mixture, $7.25; chestnut, $5; northern Colorado 6-in. lignite lump, $3; 2½-in. lump, $2.75; Rock Springs-Kemmerer lump, $4.50; nut, $3.75; steam coal, $1.35.

INABILITY to move steam coals at reasonable price levels has been the chief stumbling block in the Kentucky fields the past month. Better demand for prepared coals was a doubtful blessing because it so increased the production of slack that average realizations were unsatisfactory. Off-grade eastern Kentucky slack was peddled in the Louisville market as low as 20c. and one substantial block of tonnage was offered at freight.

Prices on prepared sizes have been well maintained at the levels established about Oct. 1 and the market readily absorbed all offerings of block coal. Lump and egg also were in good demand but domestic nut was easy and steam nut sagged. One favorable development was an increase in railroad orders to minimum tonnages; earlier in the season shipments had been cut below these figures.

The ability of the Cincinnati market to hold the advances on domestic coals established during the mid-September price flurry despite milder weather was the outstanding feature of the trade in that section last month. The heavy backlog of orders booked early in the month and the insistence of the railroads that "no bills" be counted against allotments, which held down surplus slack, were responsible for this situation.

MOST of the advance centered in low-volatile coals, where early bookings kept many mines running for the month. The weather, it is true, acted as a brake on skyrocketing prices, but up to $4.25 was paid for spot lump and egg. Even slack was stronger toward the end of the month. Lake buying and retail stocking in the West and Northwest came to the aid of the high-volatile coals and egg came in for a share of better business. Slack and mine-run, however, were soft and some distress slack sold down to 25c.

On the domestic side the Columbus market has been firm, with colder weather adding sufficient stimulus to increase mine prices on smokeless coals and the better grades of splint. The impetus given buying was strong enough to carry the trade over a period of milder weather which set in later in the month. Buying from outside territory also helped during this period and prices were maintained.

Steam business continues dull. The lack of snap is influenced by actual curtailment in industrial consumption and by bargain prices offered by shippers in distress. Mine-run was stronger than screenings but concessions to move coal were not unknown. Slack coal was weak and some sales were made as low as 40c. although the average range was 65c.@ $1.10.

EXCEPT for the fact that weather broke the backbone of the domestic demand which ushered in the month at Cleveland the conditions in that market during October were on all fours with the Columbus situation. In the local trade smokeless coal withstood the attack of the mercury better than other grades. In the steam division slack was wabbly but mine-run by comparison held its position better.

The end of October saw the Pittsburgh district suffering from price depression brought on by overproduction at the mines and dumping of prepared sizes on a reluctant retail trade which found weather conditions inimical to healthy consumer buying. Domestic prices broke from $2.75@$3 to $2.50 @2.75 and some distress tonnage moved below the $2.50 minimum.

Steam slack tumbled to 60c.—a low point for the year. Month-end quotations on gas slack were 90c. to $1. The three-quarter market was more steady and mine-run also held. Even at the low prices named many industrial buyers declined to absorb offerings and the smaller mines were hard pressed. Curtailment in operating schedules, however, is counted upon to improve the situation during the present month.

CENTRAL Pennsylvania conditions were improved last month, but the betterment was reflected more in increased production and a reduction in

Current Quotations—Spot Prices, Bituminous Coal, Net Tons, F.O.B. Mines

LOW-VOLATILE, EASTERN	Market Quoted	Week Ended Oct. 6, 1928	Oct. 13, 1928	Oct. 20, 1928	Oct. 27, 1928
Smokeless lump	Columbus	$4.00@$4.25	$4.00@$4.35	$4.00@$4.50	$4.00@$4.50
Smokeless mine-run	Columbus	2.00@ 2.25	2.00@ 2.25	2.00@ 2.30	2.00@ 2.30
Smokeless screenings	Columbus	.75@ 1.10	.85@ 1.15	.85@ 1.10	.85@ 1.10
Smokeless lump	Chicago	3.50@ 4.00	3.50@ 4.25	3.50@ 4.25	3.50@ 4.25
Smokeless mine-run	Chicago	1.90@ 2.25	1.85@ 2.25	1.85@ 2.25	1.65@ 2.25
Smokeless lump	Cincinnati	3.75@ 4.50	3.50@ 4.25	3.50@ 4.25	3.50@ 4.25
Smokeless mine-run	Cincinnati	2.25@ 2.35	2.25	2.25	2.25
Smokeless screenings	Cincinnati	.75@ 1.25	.75@ 1.25	.75@ 1.25	.75@ 1.40
*Smokeless mine-run	Boston	4.35@ 4.40	4.40@ 4.50	4.35@ 4.45	4.25@ 4.35
Clearfield mine-run	Boston	1.60@ 1.85	1.65@ 1.85	1.65@ 1.85	1.65@ 1.85
Cambria mine-run	Boston	1.80@ 2.20	1.80@ 2.20	1.80@ 2.20	1.80@ 2.20
Somerset mine-run	Boston	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
Pool 1 (Navy Standard)	New York	2.25@ 2.50	2.25@ 2.50	2.25@ 2.50	2.25@ 2.50
Pool 1 (Navy Standard)	Philadelphia	2.30@ 2.60	2.30@ 2.60	2.30@ 2.60	2.30@ 2.60
Pool 9 (super low vol.)	New York	1.70@ 1.95	1.70@ 1.95	1.70@ 1.95	1.70@ 1.95
Pool 9 (super low vol.)	Philadelphia	1.80@ 2.15	1.80@ 2.15	1.80@ 2.15	1.80@ 2.15
Pool 10 (h. gr. low vol.)	New York	1.55@ 1.80	1.55@ 1.80	1.55@ 1.80	1.60@ 1.80
Pool 10 (h. gr. low vol.)	Philadelphia	1.60@ 1.80	1.60@ 1.80	1.60@ 1.80	1.60@ 1.80
Pool 11 (low vol.)	New York	1.30@ 1.50	1.30@ 1.50	1.30@ 1.50	1.30@ 1.50
Pool 11 (low vol.)	Philadelphia	1.40@ 1.65	1.40@ 1.65	1.40@ 1.65	1.40@ 1.65
HIGH-VOLATILE, EASTERN					
Pool 54-64 (gas and st.)	New York	$1.25@$1.40	$1.25@$1.40	$1.25@$1.40	$1.25@$1.40
Pool 54-64 (gas and st.)	Philadelphia	1.25@ 1.40	1.25@ 1.40	1.25@ 1.40	1.25@ 1.40
Pittsburgh se'd gas	Pittsburgh	2.00@ 2.10	2.00@ 2.10	2.00@ 2.10	2.00@ 2.10
Pittsburgh gas mine-run	Pittsburgh	1.75@ 1.90	1.75@ 1.90	1.75@ 1.90	1.75@ 1.90
Pittsburgh gas mine-run	Pittsburgh	1.60@ 1.80	1.50@ 1.80	1.50@ 1.80	1.50@ 1.80
Pittsburgh gas slack	Pittsburgh	1.00@ 1.20	.90@ 1.20	.90@ 1.00	.90@ 1.00
Kanawha lump	Columbus	2.00@ 2.25	2.00@ 2.25	2.10@ 2.35	2.25@ 2.50
Kanawha mine-run	Columbus	1.60@ 1.75	1.60@ 1.75	1.60@ 1.75	1.65@ 1.75
Kanawha screenings	Columbus	.75@ 1.10	.85@ 1.10	.85@ 1.10	.80@ 1.10
W. Va. lump	Cincinnati	2.00@ 3.25	2.00@ 3.00	2.00@ 3.00	2.00@ 3.00
W. Va. gas mine-run	Cincinnati	1.50@ 1.65	1.40@ 1.65	1.40@ 1.60	1.40@ 1.60
W. Va. steam mine-run	Cincinnati	1.20@ 1.40	1.20@ 1.40	1.15@ 1.40	1.20@ 1.40
W. Va. screenings	Cincinnati	.50@ .75	.50@ 1.00	.25@ 1.00	.50@ 1.00
Hocking lump	Columbus	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25
Hocking mine-run	Columbus	1.50@ 1.75	1.60@ 1.75	1.60@ 1.75	1.60@ 1.75
Hocking screenings	Columbus	.85@ 1.15	1.00@ 1.15	1.00@ 1.15	.90@ 1.10
Pitts. No. 8 lump	Cleveland	1.90@ 2.25	1.90@ 2.25	2.00@ 2.25	2.00@ 2.25
Pitts. No. 8 mine-run	Cleveland	1.35@ 1.60	1.35@ 1.60	1.35@ 1.60	1.35@ 1.60
Pitts. No. 8 screenings	Cleveland	.90@ 1.10	.90@ 1.10	.80@ 1.00	.80@ 1.00

*Gross tons, f.o.b. vessel, Hampton Roads

the number of "no bills" at the mines than in rising price levels. Loadings for October were the heaviest for any month this year. The increase compared to a year ago was 16 per cent. Month-end quotations at Altoona were: Pool 1, $2.60@$2.75; pool 9, $2.15@$2.25; pool 10, $2@$2.10; pools 11 and 18, $1.75@$1.85.

The New England steam coal market marked time last month with no great change from the conditions reported for September. Every attempt to mark up prices a dime was met with slackened demand and was followed by a weakening in quotations. This happened during the last of October, when spot Navy Standard at Hampton Roads eased off from $4.50 to $4.35 with some pool 1 coal available at 10c. less. Nut-and-slack averaged $3.80.

Cooler weather had a favorable effect upon the Boston and Providence markets. On cars best-grade Pocahontas and New River commanded $5.60 the last week in the month—an increase of 10c. Spot nut-and-slack was held at $5.05@$5.10. Coastwise freights are firmer, with 90c. on steamers of 5,000 tons and upward as compared with 75c. two months ago. There has been a better tone to the all-rail market in central Pennsylvania coals but no material price change.

BETTER demand and more interest were noticeable in the New York bituminous market last month, but prices did not show an upward trend except on Southern coals, which closed the month about 25c. above the figures for the opening of the period. Apparently more coal has been bought for storage. Producers and selling agents are optimistic over the November outlook.

From the tonnage standpoint, at least, the Philadelphia trade has been registering steady improvement. Prices, however, still hang at the old levels and only in isolated cases and upon small lots of top-grade coal have producers been able to get a better price. But with continued demand the operators are hopeful that a general advance is not far distant. More interest in storage stocks is being manifested by railroad fuel agents.

Cool weather during short intervals brought about intermittent spurts in domestic fuel in the Birmingham market last month but prices showed no material change from September levels.

There was a heavier movement on dealer contracts. Spot business centered on the higher-grade coals with the market somewhat restricted by lack of demand for screenings. This, however, had the effect of slightly broadening the buying of medium and lower-grade fuels.

MONTH-END quotations were: Black Creek lump, $4.75@$5; Cahaba, $4.75@$5.25; Carbon Hill, $2.25@$2.35; Big Seam, $2@$2.25; Corona, $3.50; Montevallo seam, $5.50 @$6. All grades of steam coal were weak and the outlook for November offered little ground for optimism. In practically all instances contract shipments were cut to minimum quotas—or less. Spot buying was on a hand-to-mouth basis. Raw mine-run ranged from $1.25 to $2.25; washed coals, $1.50@ $2.25.

Domestic sizes of anthracite were in good demand in the New York area throughout October. At times there was a temporary scarcity of some sizes, particularly during the last week, when stove was short and some shippers endeavored to use it as a leverage to force the sale of other sizes. Chestnut gained in strength during the month. At times the steam sizes dragged, with No. 1 buckwheat in better shape than rice or barley.

Philadelphia also reported more activity last month with the wholesale end of the trade gaining ground as the month advanced. The increase in mine demand followed an earlier spurt in retail buying when consumers clamored for immediate deliveries. At first the retailers depended upon yard stocks but as demand continued they were compelled to place orders for mine shipment.

STOVE was the first to feel the rising demand and before long some shippers insisted that nut coal go with it. In a short time, however, some factors in the trade were so heavily loaded with stove orders that they were averse to booking additional business on that size. In a few cases nut also entered into the scarce classification, but this situation was modified toward the close of the month.

Nut, however, still leads in quantity shipped. Egg has lost some of its strength, but does not drag. Pea, on the other hand, is decidedly heavy. At the beginning of October steam sizes were strong with several company shippers asking $3.25 for spot No. 1 buckwheat. Increased buying of domestic sizes, however, eased the situation and the month closed with buckwheat easy and rice and barley pressing for a market.

Boston was another market to report an active demand for Pennsylvania domestic anthracite. Welsh coal receipts showed a slight falling off when compared with September. Factors in this trade are fighting for an increase of 25c. because the shipping market is tightening. Higher prices, however, promise to throw more business to the American product.

EXPORTS of bituminous coal from the United States during September —the latest month for which figures are available—were 1,577,436 gross tons, as compared with 1,313,543 tons in September, 1927. Anthracite exports, on the other hand, dropped from 290,047 gross tons to 264,689 tons. Coke exports increased from 75,983 gross tons to 77,114 tons. Except on coke, however, cumulative totals for the year are below corresponding figures for 1927.

Canada, of course, continues to be the biggest customer of the American export coal trade. In September the Dominion was the consignee of 1,425,094 tons of bituminous coal. Italy was second with 27,750 tons, Cuba third with 21,861 tons. Panama took 19,549 tons and the British West Indies and Bermuda, 17,226 tons.

Imports for the same month were 11,728 gross tons of anthracite, 46,128 tons of bituminous and 12,585 tons of coke. The September, 1927, figures were 7,976 tons of anthracite, 38,216 tons of bituminous and 12,646 tons of coke. In September of this year the United States imported 11,147 tons of bituminous coal from the United Kingdom and 34,981 tons from Canada.

Current Quotations—Spot Prices, Bituminous Coal, Net Tons, F.O.B. Mines

		Week Ended			
MIDDLE WEST	Market Quoted	Oct. 6, 1928	Oct. 13, 1928	Oct. 20, 1928	Oct. 27, 1928
Franklin (Ill.) lump	Chicago	$2.75@$3.00	$2.75@$3.00	$2.75@$3.00	$2.75@$3.00
Franklin (Ill.) mine-run	Chicago	2.25@ 2.40	2.25@ 2.40	2.25@ 2.40	2.25@ 2.40
Franklin (Ill.) screenings	Chicago	1.15@ 1.60	1.15@ 1.60	1.15@ 1.60	1.15@ 1.60
Central (Ill.) lump	Chicago	2.25@ 2.65	2.25@ 2.65	2.25@ 2.65	2.25@ 2.65
Central (Ill.) mine-run	Chicago	1.85@ 2.25	1.85@ 2.25	1.85@ 2.25	1.85@ 2.25
Central (Ill.) screenings	Chicago	.75@ 1.10	.50@ .85	.50@ .65	.90@ 1.10
Ind. 4th Vein Lump	Chicago	2.50@ 3.00	2.50@ 3.00	2.50@ 3.00	2.50@ 3.00
Ind. 4th Vein mine-run	Chicago	1.40@ 2.25	1.40@ 2.25	1.40@ 2.25	1.40@ 2.25
Ind. 4th Vein screenings	Chicago	1.15@ 1.40	1.00@ 1.35	1.00@ 1.35	1.25@ 1.45
Ind. 5th Vein lump	Chicago	1.90@ 2.40	1.90@ 2.40	1.90@ 2.40	1.90@ 2.40
Ind. 5th Vein mine-run	Chicago	1.25@ 2.00	1.25@ 2.00	1.25@ 2.00	1.25@ 2.00
Ind. 5th Vein screenings	Chicago	.85@ 1.15	.80@ 1.15	.60@ .90	1.00@ 1.10
Mount Olive lump	St. Louis	2.50	2.50	2.50	2.50
Mount Olive mine-run	St. Louis	2.00	2.00	2.00	2.00
Mount Olive screenings	St. Louis	1.00	1.00	1.00	1.00
Standard lump	St. Louis	2.35	2.35	2.35	2.35
Standard mine-run	St. Louis	1.75	1.75	1.75	1.75
Standard screenings	St. Louis	.25	.25	.35	.45
West Ky. block	Louisville	1.85@ 2.00	1.75@ 2.00	1.75@ 2.00	1.85@ 2.10
West Ky. mine-run	Louisville	1.00@ 1.40	.90@ 1.25	1.00@ 1.30	.90@ 1.25
West Ky. screenings	Louisville	.50@ .75	.40@ .90	.40@ .90	.40@ 1.00
West Ky. block	Chicago	2.00@ 2.25	1.75@ 2.15	1.75@ 2.15	1.75@ 2.15
West Ky. mine-run	Chicago	.85@ 1.25	.85@ 1.25	.85@ 1.25	.85@ 1.25
West Ky. screenings	Chicago	.35@ .60	.40@ .60	.35@ .50	.50@ .70
SOUTH AND SOUTHWEST					
Big Seam lump	Birmingham	$1.75@$2.25	$1.75@$2.25	$1.75@$2.25	$1.75@$2.25
Big Seam mine-run	Birmingham	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50
Big Seam (washed)	Birmingham	1.50@ 2.00	1.50@ 2.00	1.50@ 2.00	1.50@ 2.00
S. E. Ky. block	Chicago	2.10@ 2.50	2.10@ 2.50	2.25@ 2.75	2.25@ 2.75
S. E. Ky. mine-run	Chicago	1.40@ 1.65	1.40@ 1.65	1.25@ 1.60	1.25@ 1.60
S. E. Ky. block	Louisville	2.75@ 3.25	2.50@ 3.00	2.50@ 3.00	2.50@ 3.00
S. E. Ky. mine-run	Louisville	1.50@ 1.75	1.35@ 1.75	1.35@ 1.75	1.35@ 1.75
S. E. Ky. screenings	Louisville	.35@ .90	.40@ 1.00	.20@ 1.00	.40@ 1.00
S. E. Ky. block	Cincinnati	2.50@ 3.25	2.25@ 3.00	2.25@ 3.00	2.25@ 3.00
S. E. Ky. mine-run	Cincinnati	1.15@ 1.65	1.15@ 1.65	1.15@ 1.65	1.15@ 1.65
S. E. Ky. screenings	Cincinnati	.50@ .75	.50@ 1.00	.25@ 1.00	.50@ 1.00
Kansas shaft lump	Kansas City	4.00@ 4.50	4.00@ 4.50	4.00@ 4.50	4.00@ 4.50
Kansas strip lump	Kansas City	3.50	3.50	3.50	3.50
Kansas mine-run	Kansas City	2.75	2.75	2.75	2.75
Kansas screenings	Kansas City	1.75@ 2.00	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75

WHAT'S NEW

In Coal-Mining  *Equipment*

Graphite Paste Guards Against Oil Action

"Graphite Seal," a graphite paste for sealing screw thread, flange and gasket joints of pipe lines carrying hot or cold oils and gasoline has been perfected by the Joseph Dixon Crucible Co., Jersey City, N. J. Being insoluble in oils and gasoline, this product will have many applications in oil fields and refineries as well as on creosote, tar, vegetable and animal oil lines.

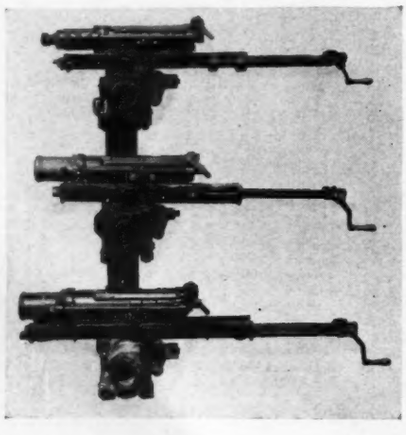
This seal expands when subjected to heat and makes leak-proof joints that stay tight under all conditions of service. However, they may be opened with ease at any time without delay or damage to tools or fittings. It is also recommended for use on hand hole and manhole plates or wherever there is a flange or gasket connection.

Sturdy Drills of the Drifter Type

The Ingersoll-Rand Co., New York City, have announced a new line of drills of the drifter type. These drills, three in number, are all of the same general construction, differing only in size. These new drills emphasize simplicity of construction with streamlines and pleasing appearance. Greater drilling speed, higher efficiencies, and easier handling are some of the features claimed by the manufacturer.

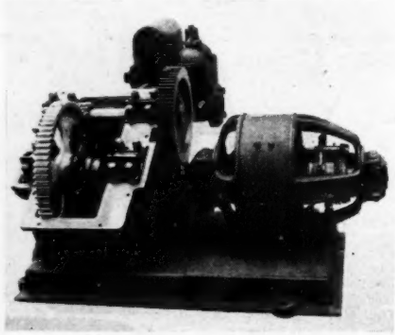
The largest of these drifters, the S-70, weighs 185 lb. It is recommended for heavy duty in hard rock and for deep holes and is especially suited for tunnel work, large mine headings and both dimension and crushed stone quarries. The 138-lb. N-75 machine fulfills the needs of the general run of work around the mine. Its power and speed enable it to do the work that formerly required machines from 20 to 40 lb. heavier. The L-74 is a real, one-man drill weighing 110 lb. At the same time it is a powerful machine and is recommended for medium soft ground, close-quarter workings or where light weight is essential.

Make Their Footage in a Hurry



Flood Oiled Pumps

Inclosed flood-oiled Austin mine pumps of a new design are now being manufactured by the Brown-Fayro Co., Johnstown, Pa. No change has been made in the water end, according to the manufacturer, but the machine has been substantially built throughout. The drive is by a heavy crankshaft with marine type connecting rod, this shaft as well as the intermediate shaft being carried by heavy interchangeable bronze bearings. Bearing caps are recessed into machined seats.

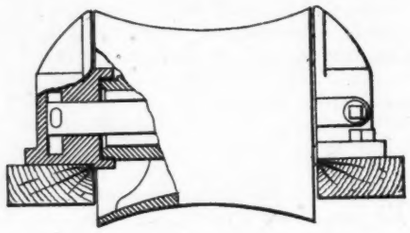


Austin Pump, Cover Removed

Lubrication is maintained by the crankshaft gear, which throws oil against the cover, from which it is directed by means of drip points to the various reservoirs. Thus a continuous flood of oil is provided at all times while the pump is operating. Oil is supplied to the crosshead and a deep stuffing box at the rear of the crosshead prevents the oil from getting out or water from entering into the oil chamber. These pumps are available in capacities of 30 to 60, 60 to 80 and 100 to 120 gallons per minute.

Slope Roller Cannot Be Set Up Wrong

An improved roller bearing slope roller has been announced by the C. S. Card Iron Works Co., Denver, Colo. Turning on a heavy shaft held stationary in the boxes, this roller, says the maker, cannot be set up so that it binds the bearings and roller; neither can it spread so that the rope can get between the roller and boxes. Among other advantages the manufacturer states that this roller will start with 50 per cent less rope friction.



Sectional View, Concave Slope Roller

No dirt can get into the roller bearings, which are grease lubricated through plugs in the boxes. The boxes have a guard which prevents the rope lying on top and sawing; it also aids in getting the rope on the roller. Wear on the roller is reduced to a minimum by the chilled face. The diameters and the grease lubrication are such that these rollers are satisfactory for use with high rope speeds, according to the manufacturer.

Speedy Power Cutter For Small Pipe

A new, portable machine for cutting pipe and tubes from ¼ to 2 in. in diameter has been placed on the market by The Oster Manufacturing Co., Cleveland, Ohio. The design of the new machine embodies several practical principles which tend to make it capable of turning out first-class work at a high rate of speed. The cutter disk, contained in a movable arm, is brought down on the pipe, which rests on rollers, thereby departing from the usual method of raising the rollers and pipe to the cutter disk. Compound leverage on the disk is obtained as the action of the arm

holding the cutter disk is controlled by a screw feed and hand wheel.

This machine is equipped with a length gage which can be set to cut any length nipple from "close" to 3 ft. on either side of the cutter disk. If a quantity of pipe is to be cut to lengths longer than 3 ft. an ordinary piece of pipe can be used with the standard stock as a length gage. The new power cutter can be furnished in either belt- or motor-driven models, and are small and compact with but few working parts.

Safety Shoe Averts Smashed Toes

The safety shoe manufactured by the Lehigh Safety Shoe Co., Inc., Allentown, Pa., is made with a special box toe that will withstand considerable pressure which may result from standing weight or falling objects. No metal is used in their construction and the toes will not be pinned fast in extreme toe accidents. These shoes are made in a large number of styles, all of which are equipped with a safety box toe.

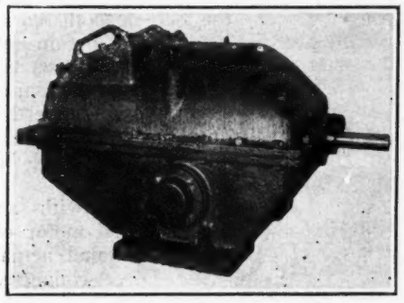
All Inclosed Motor Built For Gassy Places

A line of both alternating- and direct-current motors built for application where explosive gases, fumes or dust are present is announced by the General Electric Co., Schenectady, N. Y. These motors have been approved by the Underwriters' Laboratories and are specially constructed to prevent heat generated inside the motor by sparking or explosion from igniting any gases outside the equipment.

A two-piece cast-iron exterior is provided which is heavy enough to stand the pressures of an internal explosion. Flanged joints are sufficiently wide to cool the explosion flame. No gaskets are used as it is not intended that the motors should be gas-tight.

At standard speeds and voltages the a.c. motors are available in single-phase ratings up to 3 hp. and in polyphase ratings up to 15 hp. The d.c. motors may be either shunt- or compound-wound types at from ½ to 5 hp. All these motors are designed to operate within a temperature rise of 55 deg. C.

Approved for Explosive Atmospheres



Rapid Screening Device Gives Uniform Tests

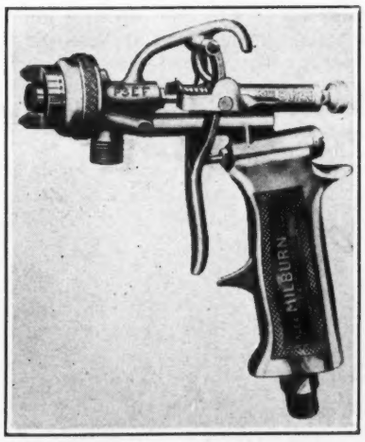
All laboratories requiring material-sizing devices may now obtain uniform laboratory tests with the Vibrote laboratory screen, made by the Traylor Vibrator Co., Denver, Colo. Use of this

Minimizes Screening Time

screen eliminates loss of time from hand screening and results in accurate sizing and separation. Rubber cushions confine vibration to the screen alone and make for quiet operation. There are no wearing parts, and abrasive material and dust do not affect the operation of the screen. The machine will hold six full-size or twelve half-size screens, and may be equipped with a time switch if desired.

Paint Spray Gun Has Important Additions

A dialed head which gives numerous spray adjustments without the necessity of testing is a feature of the Type EF paint and lacquer spray gun manufactured by the Alexander Milburn Co.,



Adjustable Without Testing

Baltimore, Md. A series of indicator numerals on the paint valve plunger enables the operator to obtain any desired volume without time loss in testing.

Emergency Plant Supplies Power and Light

A small, complete, self-contained generating unit for 110-volt service which is designed for stand-by service in places where emergency lighting is necessary in case of failure of the regular source of power has been developed by the Westinghouse Electric & Mfg. Co.

This plant has a capacity of 2 kw. and is fully automatic in both starting and stopping. The generator is driven by a one-cylinder air-cooled gasoline engine of rugged construction.

Drill-Steel Sharpener Has Greater Power

A new, small-size drill steel sharpener has just been announced by the Gardner-Denver Co., Denver, Colo. This new sharpener, pictured herewith, has been

Sharpens Drills With Speed

designated as Model DS-3. It is a twin-cylinder machine, and with it the manufacturers claim they have developed a greater clamping power than is obtainable in any similar machine now offered. They state that it is also faster in operation without slamming or pounding itself to pieces. In addition it is said that a considerably increased output will result from its use.

Mica Undercutting Made Easy

Elimination of hand work and speedy operation feature the "Ideal Mica Undercutter" now being manufactured by the Ideal Commutator Dresser Co., Sycamore, Ill. Brushes need not be removed when undercutting a commutator, and the machine can be operated in a space 3 in. wide. A micrometer adjustable guide is part of the tool and is so constructed that only one slot need be cut by hand. This tool can be used on commutators of any kind and size.

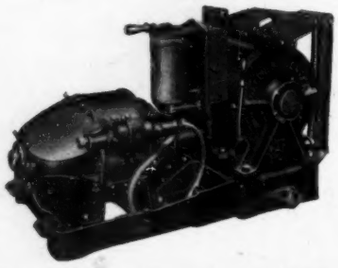
Correct Weight Given by Merrick Weighman

The Merrick "Mechanical Weighman," manufactured by the Merrick Scale Mfg. Co., Passaic, N. J., furnishes a means of accurately recording material weights irrespective of any material that may temporarily or permanently remain in the hopper after the discharge gate is closed, without frequent balancing of the empty hopper. The poise weight, which in the ordinary type of scale, is pushed along by hand, travels out mechanically to the weight of the load. A five-figured continuous counter records the total weight, or, if desired, an individual printed record may be made on a tape or ticket. When the weight is removed, the poise travels back to zero position and the scale is ready for the next weighing.

When used in connection with hoppers, the scale records the total contents of the hopper, but the totalizing recorder does not record any of this weight until all or a portion of it has been removed from the hopper. Hence the recording always is correct.

Small Scraper Hoist

A new electric slushing or scraper hoist, recommended especially for use in iron mines, copper mines and coal mines has just been announced by the Gardner-Denver Co., Denver, Colo.

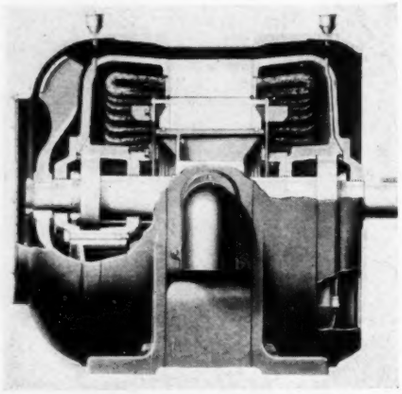


Adapted to Iron, Copper or Coal Mines

The new electric hoist is designated as Model EL-2. It is a double-drum hoist and suitable motors are provided for either a.c. or d.c., 25 to 60 cycle and 220/550 volts.

Cool Running Motors Totally Inclosed

A new line of totally inclosed fan-cooled motors, 1 to 50 hp., has been developed by Allis-Chalmers Mfg. Co., Milwaukee, Wis. In this new design all of the active parts, such as stator core, stator winding and rotor, are completely inclosed, preventing contact of outside air, dirt, fumes or moisture with the active parts. Heat is carried away by cooling air forced around and across those parts which conduct the heat from



Sectional View Showing Construction

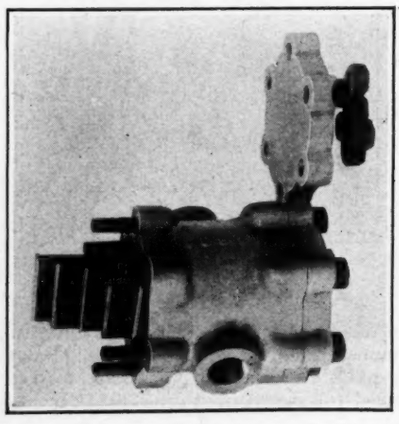
the interior to the outer surfaces. A circumferential air jacket controls the path of cooling air.

Solid cast-iron bearing housings are attached to stator end heads with machined fit, which, with grease-packed bearings, form a perfect end closure. The internal parts of the motor are readily accessible upon removal of housings. A notable feature is that in many ratings this totally inclosed design delivers the same horsepower output as is obtained from the same frame in the standard open rating. Temperature rise is within 55 deg. C. measured by the resistance method. The design provides for a most rugged construction with a minimum number of parts.

Pipe Line Purifier Dries And Cleans Steam

Using the same principles that have been successful in the Tracyfier, a smaller pipe-line purifier has been developed by Andrews-Bradshaw Co., a division of Blaw-Knox Co., Pittsburgh, Pa., for use in several sizes of air, steam or gas lines up to 3 in. In saturated steam lines it removes all moisture from the steam, delivering standard specification steam, which is free from all solids—both soluble and insoluble.

Dry-Cleans Steam and Air

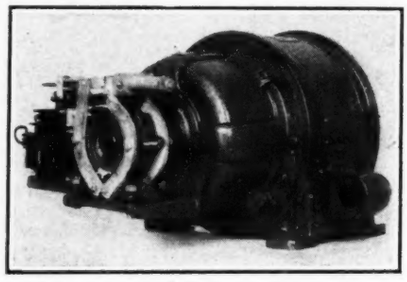


In the steam lines leading to the tar burners on open-hearth furnaces the use of completely dried steam effects a three-fold purpose—it produces a shorter, hotter, more uniform flame; saves about a gallon of tar per ton of steel, and, most important, keeps the checker chambers far cleaner.

Perfectly clean air can now be obtained for use in air tools by its use in the air line near the tools, the manufacturer asserts—one pipe line Tracyfier will dry and clean the air for several tools. This results in a lowering of out-of-service time and an increase in output per tool.

Totally Inclosed Motors Well Protected

A new line of motors for portable electric hoists and suitable also for other applications involving intermittent operation and high starting torque has been brought out by the General Electric Co., Schenectady, N. Y. The



D.C. Hoist Motor Showing Brake

line runs from 1 to 10 hp. in the direct-current types; from 1 to 11 hp., single speed, 3 and 2 phase, and from 1 to 5 hp., single phase, in the alternating-current types. Three and two-phase, slip-ring type hoist motors also are included from 3 hp. up.

The new motors are totally inclosed and all parts are well protected.

Super Screen Handles Many Sizes

All types of materials may be screened on the "Simplicity Super Screen," according to the Simplicity Engineering Co., Durand, Mich. The screen is vibrated by an arrangement of eccentrics giving an oscillating motion which vibrates the screen both horizontally and vertically. This action not only cuts the sand but cleans the screen as well, and the throw is the same whether loaded or empty. It is asserted that the unvarying throw allows all sizes from the finest up to 5 in. to be readily screened.

These screens are made with an over-all length of screen and motor of 8 ft.; width, 5 ft., 10 in., and actual screen size 3x6 ft. Direct-connected

electric or belt drives may be used and the capacity varies from 125 to 200 tons per hour, according to the makers. High-pressure greasing, mechanical bearing seals and heat-treated gears inclosed in dirt- and grit-proof housings are features of the machine.

High-Carbon Chain Lifts Heavy Loads

A hoist chain must have great strength, ability to stand wear, and must not stretch under heavy loads. Such a chain, electrically welded, is used in the Ford Tribloc Hoist, made by the Ford Chain Block Co. Each chain must stand a 50 per cent overload before being used. Ford Tribloc hoists are built in capacities from ½ to 20 tons.

Electrically Welded Chain Makes This a Sturdy Hoist

Loader and Two Men Cut Heavy Grades

Cutting down and adjusting the heavy grades in the No. 2 mine of the Bell & Zoller Coal & Mining Co., Zeigler, Ill., was recently handled in an economical and speedy manner with a National Conway shovel, manufactured by the Illinois Power Shovel Co., Nashville, Ill. The work was in charge of Paul Weir, vice-president of the Bell & Zoller company.

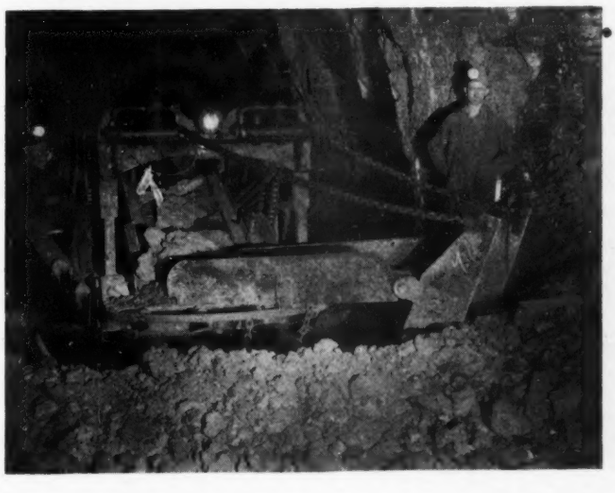
Two men with this shovel (which developed the famous Moffat tunnel in Colorado) and one road motor loaded from 80 to 100 tons of rock per day, switched their own loads, laid the track as they advanced, greased their machines and did all the other necessary labor attached to the development and progress of the grading. In preparing the ground for the shovel particular attention was paid to drilling the earth along the ribs so that it would be shot free and well broken up. A portable compressor was used, enabling the drill crew to keep the source of air close to the work. As soon as the grade was drilled at all points the track was taken up, the ground was shot and loading began.

Track was laid through the crosscuts and down the back entry to supply storage room for the cars required for two days' loading. At quitting time in the evening the motor was coupled to all the loads and pulled them to the shaft bottom to be hoisted immediately after the day's work was over. In the morning the motorman brought his own empties in. Removal of a whole cut did not, therefore, interfere with the operation of the mine.

The shovel is operated by one man who sits on the right side, using his feet to propel the machine back and forth along the track and both hands to operate the dipper. The dipper, which is 36 in. wide, is attached to the end of a boom used to convey the material by gravity to the belt conveyor.

Advance per shift was dependent upon the depth of the cut, some places being cut 7 and others 4 ft. deep. One operator and one motorman were all the crew necessary to perform all the operations. When it became necessary to lay up the track the operator backed the machine away from the face, and he and the motorman picked up a short section already supplied with steel ties and attached it by means of fishplates to the main track. Thus they were able to advance another 6 or 7 ft. Every 30 ft. the short sections were replaced by a long one and the short lengths carried ahead to be used again.

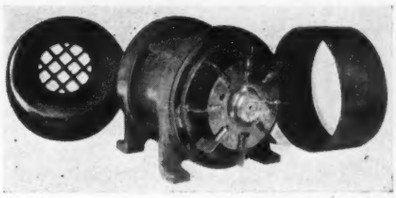
The machine may be applied equally effectively to cleaning up heavy falls or brushing entries. Here the presence of track acts to increase the rate of advance.



National Conway Shovel in the Thick of It

Motor Construction Excludes Dust

Totally inclosed motors have their output limited by temperature rise, unless some special construction is employed, as in the new type totally inclosed fan-cooled motor placed on the market by the Cleveland Electric Co., Cleveland, Ohio. The end covers are

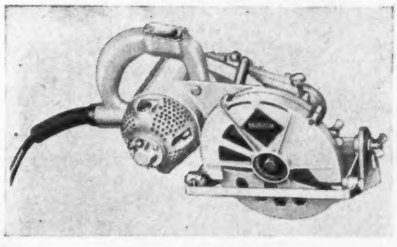


Air Cooled and Jacketed Against Dust

open, allowing circulation, but the windings are protected by an inclosing jacket of stamped copper. This inner shell incloses the entire motor and rests in the outer shell. The space between is the air passage through which air is drawn by a fan opposite the pulley end. Practically the same rating is claimed for this motor as that of the standard open type.

Electric Hand Saw Safe and Speedy

Electric hand saws equipped with safety guards are the latest addition to the "Alta" line of portable electrical tools manufactured by the Wappat Gear Works, Inc., Pittsburgh, Pa. This saw has a capacity of 2 in. and can be handled with one hand. Three models are

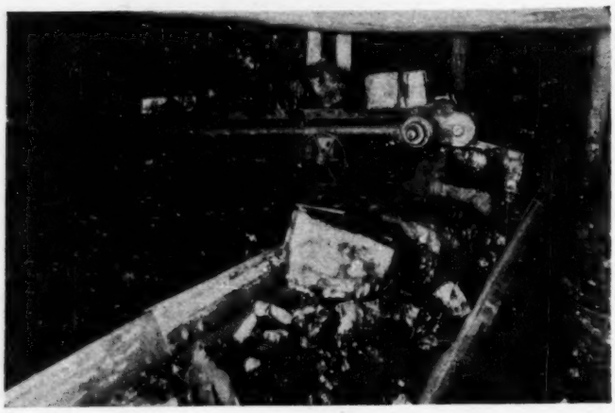


Saves Time in Sawing

supplied: one for square cutting, one for bevel cutting, and one with a dado cutter for grooving. It cuts all kinds of wood as well as soft metals, Bakelite, fiber and similar materials.

Light Face Conveyor Is Rugged

Rugged construction and light weight are features claimed for the "Jax" face conveyors manufactured by the Link-Belt Co., Chicago. The conveyor is mounted on agricultural type wheels and



Sending the Coal Out of a Kentucky Mine

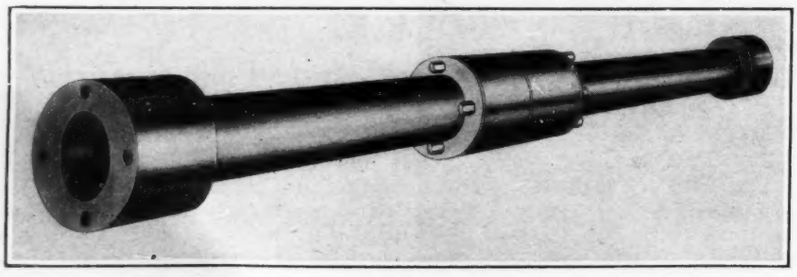
weighs 640 and 710 lb. complete with motor in the 12- and 15-ft. lengths respectively. The wheels are movable to practically any point along the frame, which consists of heavy pipe tied together by electric steel castings. A casting at the head end provides a base for the motor and a grease-tight inclosed housing in which the cut reduction gears operate.

The belt for carrying the coal is supported on its underside on a steel plate forming skirt boards to prevent spillage of the coal. The steel carrying plate and skirt boards also are designed to prevent fine coal from packing under the belt and thus decreases the power load on the motor and reduces belt wear. The height of the discharge point can be adjusted by moving the wheels backward or forward along the conveyor frame. Lubrication is seldom necessary as all bearings are either of the Hyatt or S.K.F. anti-friction type, and all gears run in a bath of grease.

Acid-Resisting Pipe Cooked in Pitch

A new mine pipe which resists acid and electrolysis is being made by the Brown Co., Portland, Maine. This new article, known as Bermico mine pipe, is made of non-conducting wood fiber treated with asphalt. The fiber is impregnated by immersion and cooking for six hours under pressure in pitch-asphalt. This makes a very strong pipe which is not affected by acid water or electrolysis.

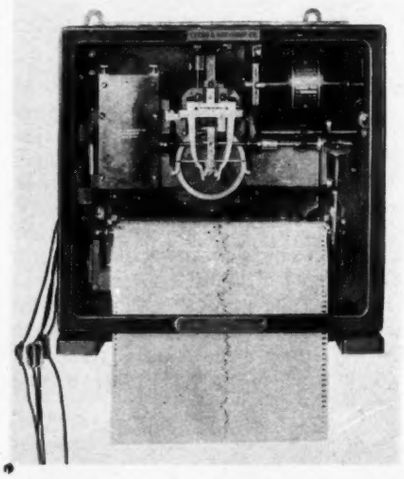
The pipe is connected by collars at the ends of each section. The collars are drilled, and threaded rods of cold-rolled metal with nuts of the same material as the pipe are used as connectors. The pipe is light in weight and may be quickly and easily handled or laid. It may be obtained in diameters from 2 to 6 in. and lengths varying from 48 to 93 in.



Cheats the Pipe Graveyard

Records CO_2 Directly

An electrical recorder is now being manufactured and marketed by Leeds & Northrup Co., Philadelphia, Pa., to be used in connection with this firm's CO_2 cell panel and control box. The items making up the complete measuring equipment are the measuring instruments, cell panel with drier, secondary filter and suction regulator, primary filter and sampling line, aspirator and suction line, current control box with milliammeter and rheostat and battery and trickle charger.

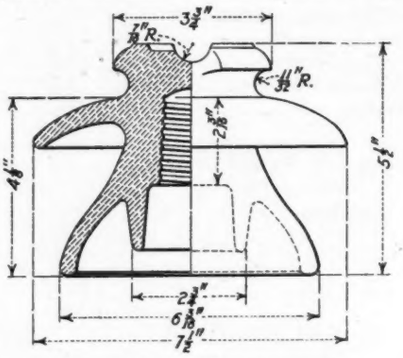


Single Chart, 1-Point Electrical Recorder

The recorders may be of the CO_2 or the CO_2 and temperature recording type, the latter being a double chart recorder for measuring both CO_2 and gas temperature. Recorders may be had in any number of points up to eight, the number of points governing the number of individual boiler records that may be taken. Double chart recorders also are available in the above number of points.

Sturdy Power Insulator Of Clear Glass

The Corning Glass Works, Corning, N. Y., has announced a new Pyrex power insulator of clear glass. Tests have demonstrated that this insulator will give extremely high power arc values and that puncture valves also are high. These insulators are of a rugged one-piece design, homogeneous, non-porous and acid-resisting.



Rugged Clear-Glass Insulator

Vibrating Screens With Ball Bearings

Ball-bearing vibrating screens are now being manufactured by the Niagara Concrete Mixer Co., Buffalo, N. Y., for use in screening various materials such as sand, clay, stone, ores, coal, coke, sawdust, cement, abrasives, molding sands and facings, zinc oxide, marble dust and other materials. The design provides for the screening of both wet and dry materials without blinding.

Niagara screens, according to the manufacturers, are constructed of high-grade iron and steel throughout. An eccentric shaft of hercules steel, turned and finish ground over all, molybdenum-steel ball bearings housed in grit- and dust-proof self-aligning housings with large oil reservoirs equipped with labyrinth seals are features resulting in a dust-tight and noiseless machine. Lubrication is by the Alemite system and the screen is equipped with industrial fittings throughout.